Consultancy Report

Farmer-to-Farmer Resource Book

Egypt: Farmer-to-Farmer Project
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EGYPT

FARMER TO FARMER PROGRAM

RESOURCE BOOK

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Horticultural Crop Cultivation in Egypt

Egypt produces many horticultural crops. Because these crops are more profitable for the farmer than field crops, they play a very important role in Egyptian agriculture.

The climate in Egypt contributes to its great potential for horticultural crop production. In Middle Egypt, the highest temperature reached during a typical year is 38°c and the lowest 6°c. Generally, the climate is warmer in Upper Egypt (sometimes reaching 45°c) and colder in Lower Egypt (although even in Alexandria, there is rarely a frost).

In Egypt the maximum level of rainfall is 5.5 cm for the month of December (the rainiest month) in Alexandria. The total rainfall for the year in Alexandria does not usually exceed 20 cm. In Upper Egypt, the rainfall is minimal. The rainfall level in Middle Egypt is about half the level in Alexandria.

A wide variety of soil conditions are present in Egypt. In general, the soils in the Nile Valley are heavy soils, and as the distance from the Nile increases, the soil becomes lighter. The newly reclaimed areas tend to have sandy, salty soil.

Landholdings in the Nile Valley are usually very small. Some are less than one feddan, which makes it difficult to use mechanization. In the newly reclaimed areas, the holdings are very large, which makes mechanization possible.

In the following sections, please note that the production levels and average yields given for each crop are for 1991. The costs of production and net revenues are based on what a farmer would spend for optimal inputs and the price and yield he would receive if optimal inputs were used.

Vegetable Crops
Introduction

Vegetable crops are a quick and profitable investment compared other field crops. The climate in Egypt throughout the year ma Egypt a natural greenhouse. Also, the difference in clim between Northern and Upper Egypt is great enough that there opportunity for diversification in the vegetables grown. Fo different vegetable commodities are cultivated annually in three main seasons: Summer, Nili (late Summer) and Winter.

The total area cultivated with vegetable crops was 1,150, feddans in 1991, which produced a yield of 10.2 million tons. vegetables in the following table are the top ten in terms acreage in Egypt.

	Vegetable	Area (feddans)	Production (tons)	Net Revenue/ Feddan*
1	Tomatoes	329,619	3,806,137	
	Varieties			6,700
	Hybrids			9,100
2	Potatoes	193,632	1,597,262	
	Summer			3,150
	Nili			2,220
3	Watermelon	102,482	893,934	3,630
4	Beans (green & dry)	61,543	178,986	1,770
5	Squash	53,013	395,607	1,400
6	Eggplant	45,411	415,278	1,700
7	Cucumber	43,274	278,319	3,140
8	Pepper	40,505	281,614	2,900
9	Cabbage	36,118	424,086	2,620
10	Garlic	26,009	220,083	4,150

Although garlic has a small area and is cultivated in only

* If optimal inputs were used

season yearly (Winter), the net revenue per feddan is very high. Egypt is the second largest exporter of garlic (after Spain), so garlic is an important export crop. Also, garlic is an important traditional crop, as Egyptians have been cultivating it for thousands of years.

The previous ten vegetables are cultivated in several governorates. The top four locations for each are listed in descending order:

Tomatoes:	Beheira, Giza, Sharkiya, Alexandria
Potatoes:	Beheira, Minufiya, Gharbia, Giza
Watermelon:	Beheira, Aswan, Matrouh, Kafr El-Sheikh
Beans:	Beheira, Minufiya, Giza, Alexandria
Squash:	Alexandria, Beheira, Sharkiya, Giza
Eggplant:	Beheira, Giza, Qalubiya, Sharkiya
Cucumbers:	Giza, Ismailiya, Beheira, Alexandria
Peppers:	Giza, Beheira, Ismailiya, Sharkiya
Cabbage:	Beheira, Giza, Qalubiya, Sharkiya
Garlic:	Minya, Beni-Suef, Beheira, Dakahliya

Vegetable Crop: Tomatoes

Total Acreage in Egypt: 329,619 feddans **Total Yield:** 3,806,137 to
Average Yield: For 1991, the average yield for all types
tomatoes was 11.54. Using optimal inputs, the average yield is:
tons/fd for open pollinated varieties and 30 tons/fd for hybrid

Geographic Distribution: (see table)

Economic Value:

Domestic Consumption: 3,994,518 tons

Standing in Economic Importance: 1

Cost to Produce: open pollinated: 1300 LE/fd
hybrid cultivars: 2900 LE
Net Revenue: open pollinated: 6700 LE/fd
hybrid cultivars: 9,100 LE

While seedlings and fertilizers cost much more for hybr
cultivars, the profit is much greater than with op
pollinated varieties.

Amount Exported: 5,482,186 kg @ 4,254,615 LE

Exported To: The top ten recipients of Egypt's toma
exports are: Saudi Arabia, United Ar
Emirates, Libya, Lebanon, Kuwait, Qata
Germany, Yugoslavia, Bahrein, and Syria

Growing Season: There are three main seasons for tomatoes in Egyp
Summer, late Summer, and Winter. Recently, a fourth season h
become possible by planting under plastic tunnels and transplanti
seedlings in mid-February to reach the flowering and fruit setti
stage by early Summer.

Season	Nursery Sowing	Transplanting Seedlings
Early Summer	January	Mid-February
Summer	Mid-February	End of March
Late Summer (Nili)	July-August	August-September
Winter	Through September	Through October

Varieties Used: Tomato varieties and hybrids used in Egypt a
numerous, but the majority of them are either for processing or a
highly firm to suit the unfavorable conditions of packing a
transportation. Tomato varieties and hybrids can be classifi
according to cultivation season:
Summer season: Super Strain B, Strain B 145 VF, Peto 86, and

Late Summer season: Castlerock, Floradade, Cal Ace, Ace 55 VF, hybrid Madeer, and Viona F_1 (E 437)
Winter season: Open field varieties: Marmande, Super Marmande, and Extra Marmande, and in plastic tunnels: Viona 2437, Turkwaza, Royal Flush, Dukado

Soil Conditions: When planting tomatoes, care must be taken to avoid diseased land, especially land where fusarium or verticillium wilt prevails. A three-year rotation is fair. It is preferable that tomatoes be planted after legumes or shallow root crops.

Although the best soil texture for tomato growing is loamy soil, tomatoes can grow in a variety of soils from sandy to heavy clay. Tomatoes can tolerate moderate salinity levels. 50% of the optimum yield can be obtained with soil salinity up to 7.6 EC or saline water up to 5.0 EC. Most of the area cultivated with tomatoes in Egypt has silty or silty loam soil.

Tomatoes (cont.)

Geographic Distribution of Tomato Cultivation

Governorate	Winter		Summer		Nili		Total	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
North Sinai	1,831	19,866	1,098	15,372	1,013	11,751	3,942	46,9
Mersa Matrouh	493	3,406	582	2,744	0	0	1,075	6,1
Alexandria	11,237	79,783	13,306	190,276	3,602	14,768	28,045	284,8
Beheira	11,492	63,652	26,869	257,758	8,479	55,538	46,840	376,9
Gharbiya	640	6,502	3,975	47,943	1,222	8,183	5,838	62,6
Kafr El Sheikh	7,900	41,477	6,897	58,255	1,853	6,692	16,650	106,4
Dakahliya	3,127	36,781	7,704	67,753	5,277	38,702	16,108	133,2
Damietta	714	5,117	3,098	41,269	2,524	8,261	7,336	54,6
Sharqiya	18,648	130,284	10,653	113,427	3,560	17,182	32,861	210,8
Ismailiya	12,851	214,117	2,539	42,417	1,044	10,664	16,434	267,1
Suez	1,600	9,920	689	4,823	463	1,713	2,752	16,4
Minufiya	1,620	11,110	3,015	24,257	668	4,882	5,303	40,2
Qalubiya	650	6,922	6,987	109,824	15	174	7,652	116,9
Cairo	165	1,900	52	446	15	119	232	2,4
South Sinai	54	454	0	0	0	0	54	4
Total Lower Egypt	73,022	621,291	88,464	976,564	29,735	178,629	191,221	1,776,
Giza	20,109	304,736	12,439	250,061	7,049	85,717	39,597	641,5
Beni Suef	2,215	28,626	3,406	42,831	11,592	138,403	17,203	209,8
Fayoum	1,210	21,708	20	300	13,362	270,573	14,592	2,925,
Minya	5,589	49,235	3,354	65,746	848	9,465	9,791	124,4

Tomatoes (cont.)

Total Middle Egypt	29,123	404,300	19,219	358,938	32,841	504,158	81,183	1267,401
Assiout	6,099	66,172	2,190	17,184	331	2,035	8,620	85,391
New Valley	527	5,481	27	177	12	96	566	5,754
Sohag	4,841	75,987	805	10,024	429	6,585	6,075	92,596
Qena	23,783	173,674	594	8,058	7,829	132,262	32,206	513,994
Aswan	7,873	55,021	113	5,341	762	4,155	9,748	64,517
Total Upper Egypt	43,123	576,335	4,729	4,784	9,363	145,133	57,215	762,252
Total Egypt	1,452,68	601,931	112,412	1,376,286	71,939	827,920	329,619	3,806,137

Cultivation

General Information: Tomatoes are the most important vegetable crop in Egypt, representing the highest yield and the greatest acreage. Tomatoes cover 40% of the total area grown in vegetables in Egypt.

Establishing Nurseries

When establishing protected cultivation in light soils (like loamy, clay loamy and silt loamy) that are rich in nutritive elements, the area should meet the following criteria:

- free from weeds
- well-drained soil
- free from diseases and nematodes
- free from or low in salts
- has not been sown with the same family of crops
- well-prepared soil that is as fine as possible

There are three main methods for sowing seed treated with fungicides:

1. Seeds are sown in rows 15 cm apart and 1 cm deep in small plots 1 x 1 or 1 x 2 meters.
2. Rows of 70 cm width are established and seeds are sown on each side at the upper third of each row.
3. Wide rows of 1-1.2 meters in width are established and seeds are sown in lines inside the rows 15 cm apart.

These methods can be followed for varieties, but hybrid seeds are very expensive so they are sown in trays in an ideal medium: pea moss, vermiculite and nutrients.

Transplanting

The distances between plants when transplanting depend on several factors. Among them are the following:

- Fertility - the plants in fertile soils need a wider area than those in poor soils.
- Season of cultivation - unfavorable climatic condition negatively affect plant growth, so greater intensification is necessary.
- System of irrigation - furrow irrigation permits cultivation of the appropriate number of plants in an area unit more easily than drip irrigation

Depending on the above factors, the distance between plants ranges from 20 cm in small vegetable growth varieties to 40 or 5 cm in vigorous hybrids. The width of rows ranges from 1-1.5 meters with drip irrigation.

Fertilizers Used: Well decomposed farmyard manure is essential for all types of soil. If it is not well decomposed and free from salts, weed seeds, diseases and nematodes, it will give diverse results.

Fertilizers with the following rates of macro elements are used for open pollinated varieties in fertile soil:

45-60 kg. P_2O_5:	as superphosphate or triple phosphate added during soil preparation.
120-150 kg. N:	as ammonium sulphate and ammonium nitrate throughout the period between transplanting until fruit setting.
48 kg. K_2O:	as potassium sulphate in two equal doses at the flowering and fruit setting stages.

With sandy soils, the previous levels should be increased by at least 50%. Also, a foliar spray with micro elements should be applied at bi-weekly intervals.

When hybrids of F_1 are cultivated, the previous levels of N, P, and K could be doubled.

Irrigation Methods: The rate of irrigation in tomato cultivation differs in number of applications and in length of intervals depending on:

- The growing season for each variety (early, medium and late)
- The texture of the soil
- Climatic conditions (rain, wind, temperature and relative humidity)
- Physiological stage of growth.

Generally, irrigation takes place each 15-20 days with 250-300 m^3 with variation depending on the above points.

Pesticides Used: Numerous pests affect tomato plants and fruits. One of the most important is white fly, which spreads viruses such as Y.L.C.V. Others include red spider mite, aphids, worms, and leaf minors. Also, diseases such as fusarium and verticillium, wilts, and early and late blights, and root rot. With all of these threats, prevention is more effective than the cure, and the majority of these threats can be prevented by regular spraying for insects and diseases.

Tomatoes (cont.)

Insecticides are sprayed in open seedbeds at three-day interval except in the early Summer season when the population of white fly and other insects is negligible. In fields where insects a expected, insecticides are sprayed weekly until the flowering a fruit setting stages. It is preferable to use the recommended insecticides alternately. The following insecticides are recommended:

Selecron 72%:	at a rate of 200 cc/100 L of wate
Marshal 25%:	at a rate of 250 cc/100 L of wate
Actellic 50%:	at a rete of 400 cc/100 L of wate

Fungicides are used early in the season as a seed dressing at a rate of 1-2 gm funqicide/1 kg seeds. Before transplanting, the seedlings are dipped in a solution consisting of 250 gm of Diathane M45 + 100 gm Benlate/100 L water for five minutes and are air dried. In the field, fungicides are not needed in the first month if the temperature and humidity are not high. Wher the plants grow larger, bi-weekly alternate spraying is recommended with the following fungicides:

Trimeltox Fort:	at a rate of 250 gm/100 L of wate
Cuprusan Super 300:	at a rate of 250 gm/100 L of wate
Mancoper Super 300:	at a rate of 300 gm/ 100 L of water

Ridomil is only added with the occurrence of early and late blights and nailspot disease.

Problems Faced:

1. Special care must be taken by nurseries to provide high quality seedlings free from viruses and other diseases.
2. While it is extremely important to use the appropriate variety or hybrid for each season and type of soil to ensu a high yield, more extension is needed to reinforce this idea.
3. Using the same agricultural practices for all varieties do not allow each variety to reach its full potential. Tomat varieties differ in vigor of vegetative growth, time of planting and production.
4. Weeds present a serious problem both as a competitor for t main crop and as media for insects and diseases.
5. Little attention is given to rotation and surrounding crop in spite of the probability that certain rotations or neighboring crops may be sources of infection.
6. Tomato growing areas are scattered and occupy small plots which make it more difficult to control diseases and insects.

Post Harvest Activities

General Information: Tomatoes can be marketed through three channels: the largest being the local market; second, the processing industry; and third, exports. Local wholesalers, retailers, and consumers prefer fully ripe fruits, as does the processing industry. Exported tomatoes must be free from defects and disease, and the stage of ripening depends on the time required for shipment to their final destination.

Handling Technique: For the local market and for the processing industry, fully ripe tomatoes are packed in crates made of palm leaves. The capacity of each crate is about 20 kg, and the tomatoes are bulk-packed with the best layer on the top of the crate.

Exported tomatoes are packed in cardboard cartons in one or more layers. Sometimes the layers are separated with strips of paper or each fruit is wrapped in thin paper. The capacity of each carton is from 3-8 kg.

Problems Faced: Despite the prevalence of firm fruit varieties and hybrids, the following factors cause serious losses:

1. The ripe stage of tomatoes at harvest makes them soft and easily damaged.
2. Palm crates easily damage or bruise the fruit.
3. Bulk-packing and attempting to fill each crate to the maximum result in too much pressure on ripe fruit.
4. Cooling chambers are not available or are inefficient.

Also, fluctuation of prices from season to season due to large fluctuations in production requires research and cooperation between various agencies to ensure more stability for producers.

Vegetable Crop: Potatoes

Total Acreage in Egypt: 193,632 feddans **Total Yield:** 1,597,262 tons
Average Yield: For 1991, the average yield for the year was 8.2 tons/fd. Using optimal inputs, the average yield as follows Summer season 12 tons/feddan; and Nili season 10 tons/feddan.

Geographic Distribution: Of the total area cultivated in potato in Egypt, 77.6% is in Northern Egypt, 17.5% is in Middle Egypt, and 4.9% is in Upper Egypt. The main governorates in potato cultivation are Beheira, Minufiya, and Gharbia. (See table)

Economic Value:

Domestic Consumption: 1,401,874 tons

Standing in Economic Importance: 2

Cost to Produce: 1650 LE/fd in Summer season, 1780 LE/fd in Nili season. One third of the cost is seeds, one third labor and machine and one third chemicals.

Net Revenue: 2242 LE/fd in Summer season
1150 LE/fd in Nili season.
Farmgate price is 400 LE/ton

Amount Exported: 198,126,334 kg @ 133,236,870 LE
Also, potatoes for sowing: 18,008 kg @ 13,117

Exported To: Immature potatoes of the King Edward and Ca varieties are exported from the Summer season cultivation Europe, mainly to England. Mature potatoes cultivated in the Nili season are exported to the Arab countries, making up 40-50% of all potato exports.

The top ten recipients of Egyptian potato exports are: The United Kingdom, Greece, Saudi Arabia, France, Libya, Germany, United Arab Emirates, Lebanon, Italy, and Czechoslovakia.

Potatoes for sowing are exorted to:Tunisia, United Arab Emirates, and Oman and Moskat,

Growing Season: There are two seasons for potatoes in Egypt: Summer (planted throughout December and through the first week February) and Nili or Late Summer (planted throughout Septembe and October -- the optimal time is the first week in October). Recently, the Horticultural Research Institute has begun using

intermediate season (planted throughout November) between Summer and Nili.

Yield is higher in Summer than in Nili because the seed potatoes used in the Summer season are better. Seed potatoes used in the Summer season are either imported or selected from the previous year's crop, while the seed potatoes used in Nili are obtained from the Summer yield of the same year.

Varieties Used: In terms of area cultivated, the main varieties of potatoes in Egypt are: Alpha, Grata, Spunta, Diamond, King Edward, Arran Banner, and Cara. Secondary varieties are: Desiree, Jaerla, Cosima, Ajax, and Cloudia. Varieties can also be classified into early (less than 110 days for cultivation) and medium to late (more than 110 days for cultivation). The early varieties include King Edward, Draga, Ajax, Arran Banner, Jaerla and Spunta. The mid-late varieties are: Alpha, Grata, Patrones, Desiree, Cosima, Cara, Diamond, and ESCA.

Soil Conditions: Rotation is very important in potato production as micro-organisms that cause brown rot, bacterial soft rot and scab (one of the main reasons for decay of potato seeds and tubers) multiply in the soil if potatoes are cultivated on the same land year after year. A minimum of three years rotation is recommended.

Light soils such as loamy, silt loam or silty are the best for potato planting, especially if such soils are free from salinity and are well drained. Sandy soils can produce a good yield if fertilized well with organic and/or chemical fertilizers. Heavy clay soils have a negative effect on the size and quality of the tubers because of their compactness and poor aeration. Well-decomposed manures improve the texture of heavy soils and can help to achieve good yields.

Potatoes (cont.)

Geographic Distribution of Potato Cultivation

Governorate	Summer		Nili		Total	
	Area	Prod.	Area	Prod.	Area	Prod.
North Sinai	0	0	115	649	115	649
Alexandria	2,027	16,647	2,369	15,488	4,396	32,135
Beheira	22,967	234,375	33,537	165,223	56,604	399,598
Gharbia	13,113	151,003	9,332	83,008	22,445	234,011
Kafr El Sheikh	315	3,594	57	506	372	4,100
Dakahliya	6,155	57,750	6,179	54,309	12,334	112,059
Damietta	893	5,149	1,099	6,262	1,992	11,411
Sharkiya	979	8,029	269	2,704	1,248	10,733
Ismailiya	89	664	0	0	89	664
Suez	0	0	0	0	0	0
Minufiya	18,501	158,939	25,620	194,352	44,121	353,291
Qalubiya	3,515	20,506	3,193	38,318	6,708	58,824
Cairo	0	0	0	0	0	0
Total Lower Egypt	68,554	666,656	81,770	560,819	150,324	1,217,475
Giza	7,551	64,278	11,636	101,686	19,187	165,964
Beni Suef	441	4,013	1,400	17,080	841	21,093
Fayoum	59	500	47	360	106	860
Minya	3,632	29,348	9,118	75,561	12,750	104,909
Total Middle Egypt	11,683	98,139	22,201	194,687	33,884	292,826
Assiout	13	111	76	989	89	1100
New Valley	0	0	0	0	0	0
Sohag	27	287	1,508	22,543	1,535	22,821
Qena	0	0	0	0	0	0
Aswan	0	389	0	0	0	0
Noubaria	0	0	7,800	53,040	7,800	53,040
Total Upper Egypt	40	389	9,384	76,582	9,424	76,961
Total Egypt	80,277	765,184	113,355	832,078	193,632	1,597,262

Potatoes (cont.)

Potatoes (cont.)

Cultivation

General Information: In terms of area and yield, potatoes are th second most important vegetable crop in Egypt.

Summer planting is cultivated mainly with imported seeds. In recent years, to attain self-sufficiency, 50% of the required seeds have been produced locally, while the other half have been imported. The domestic seeds are selected from the previous Summer season and stored from May/June until December/January a 3-4°C. The seeds are obtained from cultivars planted with the highest rank of imported seeds, "E" rank. Because of the high cost of such seeds, the tubers are cut into two pieces. Each piece should have at least two or three buds, and its weight should be no less than 50 gm. Also, seeds should be cured for hours in a shady place before planting.

Nili and intermediate plantations are almost all cultivated wit seed potatoes reserved from the production of Summer season whi have been stored either at low temperatures (3-4°) or in piles covered with straw (nawala). In these two seasons, seed potato should be used whole, so the seed potatoes chosen are small in size (35-60mm). Because whole seed potatoes are used, higher quantities of seed potatoes are used: 1.25-1.75 tons/fd in Nili and intermediate and only 750K/fd in Summer.

Fertilizers Used: Potato plants need high levels of organic and chemical fertilizers. During soil preparation a quantity of 20 30 m^3 of well-decomposed farmyard manure mixed with 30-40 kg P_2 should be added. A similar quantity of P_2O_5 is usually added a the time of planting, but far from the seeds.

Nitrogen is added at a rate of 150 kg/fd in three equal doses: the first at planting time; the second after germination; and t third two weeks after germination.

Potassium is added at a rate of 48-72 K K_2O/fd after the completion of germination.

In sandy soil, the previous levels are increased by 50% or more and the fertilizers are usually dissolved in water and applied through the drip irrigation system.

Irrigation Methods: Potato plants vary in water requirements according to the texture of soil and the season of planting. i Summer season, irrigation should take place from nine to elever

Potatoes (cont.)

times, while in Nili season, six times is sufficient. The quantity of water needed in each application range from 250-350 m^3 according to the type of soil and climatic conditions.

Sandy soil can be irrigated with drip irrigation if suitable moisture and fertilizer levels are present. Then a high quality yield in terms of shape and size can be expected.

Suitable soil moisture during tuber formation (6-8 weeks after planting) is important. Terminating irrigation before harvesting will facilitate extracting the tubers easily, cleanly and safely.

Pesticides Used: Potato plants and tubers may suffer from several diseases and pests. The main pests are crickets (gryllotalpa gryllotalpa), cut worm, leaf hopper, white fly and aphids. Crickets and cut worms are controlled with poison baits. Aphids, white fly and leaf hoppers are sprayed with actellic 50% at a rate of 1.5L/fd or pirimor 50% at a rate of 300gm/fd.

Potato diseases are very serious and numerous. they can be classified into three groups:

1. Viral diseases
   This group includes leaf roll, A, X, Y, F, and S viruses. Control: plant tubers of "E" rank (free from viruses), using a good rotation system, and using insecticides.
2. Bacterial diseases
   These include brown rot, bacterial soft rot, and black leg. Control: exclude infested, injured seed potatoes.
3. Fungal diseases
   These include early and late blights, fusarium and verticillium wilts, sclerotium rot, common scab, black scurf, pink rot and fusarium dry rot. Control: early and late blights can be prevented by spraying every two weeks with Diathane M45 (1-1.5 kg/fd) or cured with Ridomil (1kg/fd). Potato tuber moth and tuber rots in seed potatoes can be controlled by dusting with Seven 10% or Vitafax captane at a rate of 1.5 kg/ton of seed potatoes.

Problems Faced:

1. The prices for seed potatoes are very high, sometimes representing 40-45% of total production cost.
2. Cultivating potatoes is considered risky and expensive

Potatoes (cont.)

because of the high costs and the possibility of infection by diseases or pests.

3. In the Summer season, some farmers divide seed potatoes in small pieces to minimize their costs. This results in wea plants and in the absence of many plants.

Post Harvest Activities

General Information:

Potatoes are stored to be used as seed potatoes either for Nili season or the following Summer season, so maintaining the quality is important.

Handling Technique:

Seed Potatoes stored in refrigerator units:

- The best temperature is from 4-5°C with relative humidity of 85-95% and with good aeration between the sacks or boxes.
- The seed potatoes should be removed from the cooling system at least two weeks before planting. This period is sufficient to permit the buds to germinate.

Seed Potatoes stored in "Nawala":

- As most seed potatoes stored in nawala are used in Nili season, they should be small (35-60mm).
- Seed potatoes stored in nawala should be examined twice during the storage period to remove any infested tubers.
- Germination of seed potatoes stored in nawala must occur under indirect sunlight before planting.

Problems Faced: Potato growers encounter problems in marketing with the local market and with exports because of price fluctuations.

The main problems encountered with exporting potatoes are:

1. There are no contracts between the exporters and the growers.
2. Sometimes, frost and diseases negatively affect the yield quality, so quantities suitable for export are reduced.
3. Exporters face problems with shipping companies regarding space, cooling chambers, etc.
4. There is a lack of information about the requirements of foreign countries for produce imports.

Vegetable Crop: Garlic

Garlic is one of the most ancient crops in Egypt, as Egyptians were cultivating it several thousand years ago.

Total Acreage in Egypt: 26,009 feddans **Total Yield:** 220,083 **Average Yield:** In 1991, the average yield of all varieties was 8.5 tons/fd. Using optimal inputs, the yield is: Baladi variet 10-16 tons/fd and Chinese variety 8-12 tons/fd.

As a main crop, garlic covers 16,670 feddans and is intercroppe on an area of 9339 feddans. The yield of intercropped garlic i lower than that for garlic grown alone, but the yield is significant in terms of total production.

Geographic Distribution: Garlic is cultivated all over Egypt, b is concentrated mainly in Middle Egypt where 62.2% of the area cultivated in garlic is located. 31.2% of the area grown in garlic is in the Northern region and 6.5% is cultivated in Uppe Egypt. Beni Suef governorate is the biggest producer with 10,6 feddans cultivated with garlic. (See table)

Economic Value:

Domestic Consumption: 216,287 tons

Standing in Economic Importance: 3

Cost to Produce: 1300-1600 LE/fd Net Revenue: 2200-4150 LE/fd

The total variable cost for one feddan of the Baladi varie is 1300 LE and for the Chinese variety, 1600 LE. For the Chinese variety the cost for supplies is higher (1100 LE/f than for the Baladi variety (800 LE/fd) because the requir cloves are nearly double the weight. Both varieties requi 500 LE/fd for mechanization costs. For the domestic marke the net revenue for the Baladi variety is 2200 LE/fd, and for the export market, 2900 LE/fd. The Chinese variety is mainly produced for export, and can results in a net reven of 4150 LE/fd.

Amount Exported: Fresh/3,785,032 kg @ 6,289,785 LE
Dried/11,350 kg @ 37,390 LE
Egypt is the second largest producer of garlic in the worl (after Spain), and garlic is an important export for Egypt

Exported To: The top ten recipients of fresh Egyptian garlic are: Saudi Arabia, Italy, Lebanon, Libya, Germany, France, Greece, Kuwait, Austria, and Yugoslavia. Jordan a

Garlic (cont.)

the Netherlands are also big importers.

Dried garlic is exported to Libya, Romania, Yugoslavia, Germany, France and the Philippines.

Growing Season: The baladi variety of garlic is cultivated from the end of August to the end of October. The optimal time is in the middle of September, which enables the plants to mature earlier and give a higher yield. Chinese garlic is cultivated somewhat later. The appropriate time in the Northern region is the first week of October, while in Upper Egypt the second or third week in October is appropriate.

Varieties Used: Two varieties of garlic are grown in Egypt:

1. Baladi or Egyptian variety
   This variety is distinguished by it early harvest and its good storage quality. The bulbs are white and large and may contain up to sixty cloves.

2. Chinese variety
   The bulb size is somewhat smaller than the baladi variety and the color is white mixed with purple. This variety is cultivated later than the Egyptian variety by two weeks. The cloves are larger in size than the cloves in the baladi variety and number only 5-20 cloves per bulb.

Soil Conditions: Loamy or silt loam soil is the most suitable soil for garlic production. Heavy soils press on the bulbs, resulting in small bulb size. Also, garlic can grow with light salinity.

Garlic (cont.)

Geographic Distribution of Garlic Cultivation

Governorate	Alone		Intercropping		Total	
	Area	Prod.	Area	Prod.	Area	Prod.
Mersa Matrouh	0	0	0	0	0	0
Alexandria	128	256	0	0	128	256
Beheira	166	1,162	20,227	7,960	2,193	9,122
Gharbia	54	355	924	5,102	978	5,457
Kafr El Sheikh	27	119	0	0	27	119
Dakahliya	555	3,891	1,039	4,611	1,594	8,502
Damietta	54	189	0	0	54	189
Sharkiya	1,396	9,454	0	0	1,396	9,454
Ismailiya	10	65	0	0	10	65
Suez	0	0	0	0	0	0
Minufiya	183	1,403	19	57	202	1,460
Qalubiya	1,396	12,412	149	898	1,545	13,303
Cairo	0	0	0	0	0	0
Total Lower Egypt	3,969	29,306	4,158	18,621	8,127	27,927
Giza	744	4,387	0	0	744	4,387
Beni Suef	1,996	18,284	2,544	21,361	4,540	39,645
Fayoum	236	1,580	0	0	236	1,580
Minya	8,295	97,121	2,364	17,569	10,659	114,690
Total Middle Egypt	11,271	121,372	4,908	38,930	16,179	160,302
Assiout	243	2,707	0	0	243	2,707
New Valley	0	0	0	0	0	0
Sohag	511	3,760	0	0	511	3,760
Qena	360	1,945	31	156	391	2,101
Aswan	316	1,519	242	1,767	558	3,286
Total Upper Egypt	1,430	9,931	273	1,923	1,703	11,854
Total Egypt	16,670	150,609	9,339	59,474	26,009	22,083

Cultivation

General Information:
Garlic plants need mild weather in the first stages of growth, but during clove formation (15-18 weeks after sowing) the plants need colder weather for good bulb formation. Generally, the bulbs require 22 weeks to form and should be harvested 26-29 weeks after sowing.

Garlic plants have small vegetative growth and shallow roots. These advantages give growers the opportunity to intensify the plant population or practice intercropping with other crops such as maize, cotton and beans.

Clove quality
The condition of cloves used in garlic cultivation is the most important factor in obtaining high quality and a large yield. Cloves should be turgid and free from disease. For best results, bulbs should remain whole until the time of planting to protect the cloves and enhance germination.

The size of cloves planted is directly related to the size of the bulbs produced in both baladi and Chinese varieties. When planting garlic alone, 150-200 kg/fd of Baladi bulbs and 350-400 kg/fd of Chinese bulbs are required. When intercropping, only half the above amount is needed.

Method of Planting
The selected cloves are planted in rows 50-60 cm in width on the upper third of each row. The cloves are cultivated on both sides of the row with 7-10 cm between plants. The appropriate method of cultivating garlic cloves is to irrigate the soil two-three days before planting. The cloves are planted upright with two thirds of the clove in the soil. A light irrigation is performed after planting. Sometimes the cloves are soaked in fungicide for one half hour and then stratified for 12 hours before planting. Missing plants can be replanted after 7-10 days with Baladi and 20-25 days with Chinese cultivars.

Fertilizers Used: Garlic plants respond well to nitrogen, phosphate and potassium, if these nutrients are added at the appropriate time and in the correct doses. Each of these elements is essential and directly affects the quality and quantity produced. The recommended quantities of fertilizers are as follows:

Garlic (cont.)

120-150 kg N	as ammonium sulphate or ammonium nitrat
60-75 kg P_2O_5	as superphosphate or triplephosphate
48 kg K_2O	as potassium sulphate

Well decomposed organic manure at a rate of 20-25 m^3 mixed with 100 kg ammonium sulphate and 150 kg superphosphate is added during soil preparation. After planting, the rest of the fertilizers are divided into three equal doses. The first third is added after germination is completed, the second one month later, and the third one month after the second dose.

Irrigation Methods: Irrigation is one of the major factors affecting garlic yield. While the number of and intervals between irrigation depend on growth stage, type of soil and climatic conditions, the following points are a general guide:

- Garlic plants need to be irrigated from 6-8 times during the growing season.
- The interval between applications is from 10-15 days.
- Irrigation should be terminated 15-20 days before uprooting the plants.
- The average quantity of water per application is 200-250 m^3.

Pesticides Used: The main pests that infest garlic are mites, onion maggot and thrips. Mite is controlled early by treating the bulbs with methyl promide gas. If the symptoms appear durir the growing season, then the plants should be sprayed with Comit at 50 cc/100 L or Tedefole EC at 250 cc/100 L. Selecron 72% at rate of 750 cc/fd or Actellic EC 2 L/fd are applied at the end c February to protect against onion maggot and thrips.

The major diseases affecting garlic are: rust, white rot, downy mildew, purple blotch and nick rot. Plants infected with downy mildew, purple blotch and rust are sprayed with Ridomil Z 58% at a rate of 250 gm/100 L. White rot is a serious disease because the germs can live in the soil for periods up to 20 years. The best treatment is to avoid infested soils by not planting garlic where garlic has been planted within the last 8-10 years, and taking care not to use infected bulbs. Also, selecting healthy bulbs and spraying for onion maggots can protect the plants fror nick rot.

Garlic (cont.)

Problems Faced: Sometimes deterioration of local varieties results from planting small garlic cloves or not carefully selecting cloves. Also, the average yield per feddan is decreasing for garlic because some farmers do not follow correct agricultural practices and/or do not follow correct rotation patterns.

Post Harvest Activities

General Information: Garlic plants reach maturity after 25-28 weeks with the Baladi variety and after 30-32 weeks with the Chinese variety. It is easy to tell if the plants have reache maturity. With the Baladi variety, 80-90% of the plants will b bending toward the ground, while with the Chinese variety, the leaves become yellowish in color.

Handling Technique:
The whole plants are kept in a shady place for two to three we after being uprooted. Garlic plants lose 30-35% of their weig in curing. After this, the plants are bound in small packages (about 5 kg).

Problems Faced: Storage capacity could be improved if growers were made aware of effective agricultural treatments, signs of plant maturity, and curing processes.

The size of the area cultivated in garlic fluctuates because: 1)The demand of foreign countries requires more study and 2)th is not enough capacity in companies that dry and extract oil f Garlic.

Garlic (cont.)

Fruit Crops
Introduction

Fruit production plays an important part in agricultural production in Egypt. Egypt's climate is suitable for the production of many fruits such as: citrus, bananas, grapes, apples, pears, figs, and similar crops. The demand for fruit crops is very high in Egypt, and they give the producer a high return on his investment compared with field crops.

The fruit growing area has expanded rapidly in the last five years, from 545,375 feddans in 1986 to one million feddans in 1991; an increase of 55%.

The following table shows the total acreage and economic value of the most important fruit crops in Egypt for 1991.

	Crop	Economic Value	Area (Feddans)	% fruit area	Production (tons)
1	Citrus	998,789,000	365,160	36.5	2,477,918
2	Bananas	429,577,000	37,620	3.7	452,186
3	Grapes	291,097,000	153,698	15.4	693,009
4	Apples	261,775,000	67,569	6.8	174,513
5	Mangoes	199,166,000	53,449	5.3	159,333
6	Figs	113,442,000	3,974	0.3	151,107
7	Peaches	85,227,000	54,233	5.4	142,045
8	Pears	38,224,000	22,167	2.2	54,606

In terms of post harvest activity, most of the fruits produced in Egypt are for the fresh fruit market. There is some processing for fruit juices and jams, but these activities are very limited because of a lack of processing factories.

Fruit Tree Nurseries

Number of Nurseries: 941 **Total Acreage:** 431 feddans

Production: 871 private sector nurseries produce 4,534,050 seedlings per year, and 70 government nurseries produce 1,564,9 seedlings per year.

Geographic Distribution: Most of the nurseries are found in Giza, Minufiya, Qalubiya, Gharbia, Sharkiya, and Beheira governorates.

General Information: The Egyptian fruit tree nursery industry plays a very important role in the development of fruit production in Egypt. All Egyptian orchards are cultivated with trees produced in local nurseries.

Licensing/Requirements: All nurseries in Egypt are under the supervision of the Ministry of Agriculture, and to establish a nursery, a farmer must obtain a license. The process of obtaining a license includes soil analysis at the site of the planned nursery, and giving information about the types of plan that will be produced there. Once production has begun, any seedlings produced in the nursery must be inspected for insects and disease by specialists from the Ministry of Agriculture before the seedlings can be released into the market.

Methods of Fruit Propagation: The following are the methods an rootstocks used in Egyptian nurseries.

1. Citrus — Citrus cultivars are propagated commercially by budding on sour orange seedling rootstock.
2. Banana — Commercial propagation of the banana plant is entirely asexual, consisting essentially of division of the rhizome and replanting the piece or "suckers".
3. Mango — Mangoes are commonly propagated by top grafting mango seedling rootstock in early Spring.
4. Grape — All grape cultivars are propagated by hardwood cuttings during Winter.
5. Apple — Apple cultivars are commercially propagated by T

budding in June or late in August and also by top grafting in January on the following rootstocks:

a) Seedling or standard rootstock (malus communis) was commonly used until recent years. The trees on this vigorous rootstock are slow to come into production.

b) MM106 is a semi dwarf rootstock, producing a tree 65-75 % the size of one produced on seedling rootstock and is earlier bearing.

6. Pear — Pears are commonly propagated by Fall or June budding, using the T-budding method on seedling pear rootstocks (pyrus communis). Seeds of pyrus communis rootstock are imported from Europe annually.

7. Peach — Peach cultivars are propagated commercially by T-budding in June or August on the following rootstocks:

a) Mit Ghamr seedling rootstock was commonly used until recent years. Roots of this rootstock are quite susceptible to root knot nematode, especially in sandy soils.

b) Nemaguard seedling rootstock is now used for its resistance to root knot nematode. Most peach growers are satisfied with peaches growing on nemaguard. Seeds of nemaguard are imported from the United States and Europe annually.

8. Fig — The fig is easily propagated by hardwood cuttings in the Winter. A common method applied by some fig growers is to plant long cutting (3-4 feet), their full length in the ground where the tree is to be located permanently, sometimes two cuttings are set in one location to increase the chance of having one grow.

Problems Faced:

1. Registered mother plants that are free from disease (especially viral diseases) are not readily available. These are important as a source of clean budwood for the nurseries in order to provide healthy and good quality trees for fruit growers.

2. It is difficult to find laborers skilled in performing the

Fruit Tree Nurseries (cont.)

new propagation methods.

3. There is a lack of coordination between the various nurser programs to determine the number of seedlings required for each species and cultivar.

Fruit Crop: Apple

Total Acreage in Egypt: 67,569 feddans **Total Yield:** 174,513 tons
Average Yield: 3.9 tons/feddan

Geographic Distribution: Gharbia, Beheira, Minufiya, and Assiout governorates

Economic Value: 261,775,000 L.E.

Domestic Consumption: 261,767,258 LE

Standing in Economic Importance: 4

Cost to Produce: 2514 LE/fd Net Profit: 3385 LE/fd

Amount Exported: 2,052 kg @ 7,742 LE

Exported To: Saudi Arabia and Lebanon

Varieties Used: Most of the world's high quality apple cultivars have winter chilling requirements that are not met by the Egyptian climate. Total chilling hours below 7°c, even in the coldest winters do not exceed 300 hours.

The main varieties are Anna and Dorsett Golden cultivars grafted on MM106 rootstock, which produces a tree 65-75% of size of trees grown on seedling rootstock. Red Burcher and Volos are varieties that were prominent before 1979, and have high productivity but poor fruit quality. Ein Shemer variety is also grown.

Soil Conditions: Most orchards are in sandy or sandy loam soils. Apples grow most successfully in well drained soils. They can grow in calcareous soils containing up to 18% calcium carbonate. It is difficult to grow apples in heavy soils.

Cultivation

General Information: The apple growing area is increasing gradually because apples give a high return compared to other fruit crops. On average, gross revenue for apples is 57% of the value of the yield.

Fertilizers Used:

Organic fertilizers

Soil application of manures occurs during November and December. Rates of application are generally from 15 to 20 cubic meters per feddan.

Chemical fertilizers

As a general rule, apple trees need yearly applications of nitrogen, phosphorous, and potassium. Rates of application for mature trees are generally from 70 to 100 kg. of actual nitrogen and 110 kg. of potassium sulfate per 100 trees in one or two applications. The first application is made 3 to 4 weeks before bud break and the second after the fruit set. Phosphorous application is made by adding 100 kg. of Super Phosphate per feddan mixed with manures during the winter.

The minor elements most commonly deficient are zinc, iron and manganese and this is best corrected by applying nutrient foliar sprays throughout the season.

Irrigation Methods: Flood irrigation is most common in the Delta while drip irrigation is used in the sandy soils of the newly reclaimed areas.

Important Insects: The most prevalent pests for the apple crop in Egypt are: apple shoot borers, woolly aphids, red mites, and scale insects.

Important Diseases: The most prevalent diseases are: powdery mildew, apple scab, crown gall, phytophthora black rot, and apple rust.

Pesticides/Fungicides Used: The following chemical are used:

1. Cidial L50 for apple shoot borers
2. Mineral oil plus Malathion 7% for woolly aphids and scale insects

Apples (cont.)

3. Kalthane for red mite
4. Rubigan or Nemrode for powdery mildew
5. Diathane M45 or Rubigan for apple scab
6. Hostathion or Lannate for chafer

Problems Faced:

1. Many growers do not follow the recommendations for pruning and training of apple trees. This may provide a structurally weak framework, minimum fruit area, and consequently low yield.

2. Excess applications of nitrogen fertilizer can cause softer fruit, poorer fruit color, reduced storage shelf life, increase bitter pit and excessive shoot growth.

3. Many growers do not thin the fruit on their trees. Fruit thinning improves fruit size, quality and uniformity; reduces limb breakage; assists in maintaining tree vigor; and allows small, blemished and poorly shaped fruit to be eliminated before harvest.

4. Pre-harvest drop: with the Anna cultivar, fruit dropping immediately before and during harvest may result in considerable losses. The drop may be substantially reduced with the use of chemicals.

5. Inadequate control of pests; mainly borers, mildew, and scab.

Post Harvest Activities

General Information: In Egypt, apples are hand harvested into small bins. The inside surfaces of the bins must be smooth an clean, as roughness may injure fruits.

Harvest time for Anna and Dorsett Golden varieties begins from early July to mid-August.

Handling Technique: Harvested apples are graded in the field a packed into cardboard boxes before being shipped to the fresh fruit/vegetable market. Some growers prefer to store their cr in coolers at 0-5° c for two to three months in order to recei higher prices at the end of the season.

Fruit Crop: Pears

Total Acreage in Egypt: 22,167 feddans **Total Yield:** 54,606 tons
Average Yield: 5 tons/fd

Geographic Distribution: Pear orchards are found mainly in Alexandria, Beheira, Gharbia, and Minufiya governorates.

Economic Value: 38,224,000 LE

Domestic Consumption: 38,224,000 LE

Standing in Economic Importance: 8

Cost to Produce: 2418 LE/fd Net Profit: 1082 LE/fd

Amount Exported: 5,702 kg @ 9,227 LE

Exported To: Saudi Arabia

Varieties Used: Most of the world's high quality pear cultivars are European pears, which have high chilling requirements not met by the Egyptian climate. In Egypt the main variety is "Le Conte" which is a hybrid of pyrus communis and pyrus serotina. In 1981, the Ministry of Agriculture introduced two varieties with low chilling requirements: Hood and Floridahome. These two varieties have shown promising results. The rootstock used for pear propagation is pyrus communis, and its seeds are imported from Europe each year.

Soil Conditions: Pear trees can grow well in a wide range of soils, from heavy textured soils to sandy or sandy loamy soils. They can also grow successfully in calcareous soils containing calcium carbonate up to 18%.

Cultivation

Fertilizers Used:

Organic Fertilizers

Manures are applied to the soil during November and December at rate of 20 m^3.

Chemical Fertilizers

As a general rule, pear trees require yearly application of nitrogen, phosphorus and potassium. Rates of application for mature trees are 45-65 kg of actual nitrogen and 100 kg of potassium sulphate per 100 trees, in one or two applications. The first application is made 3-4 weeks before bud break and th second after fruit set. Phosphorus application is made by addi 100 kg Super Phosphate during November and December with manure application.

The minor elements most commonly deficient are iron and zinc, these deficiencies can be corrected by using foliar sprays throughout the season.

Irrigation Methods: In Egypt, two methods of watering are commonly used in pear orchards. Drip irrigation is used mainly in the newly reclaimed areas (sandy soil), while flood irrigati is used mainly in the Nile Delta.

Important Insects: The most important pear insects are: pear shoot borers, scale insects, red mite, and Mediterranean fruit fly.

Important Diseases: The most important pear diseases are: blos blight, powdery mildew, and crown gall.

Pesticides/Fungicides Used:

1. Cidial L50 for shoot borers
2. Mineral oil plus Malathion 57% for scale insects
3. Kalthane for red mite
4. Rubigan or Nemrode for powdery mildew

Problems Faced:

1. Pear production is rather low due to a lack of pollenizers and improper pruning.
2. The quality of fruit is poor and fruits must be stored for

Pears (cont.)

considerable periods of time at low temperatures.

3. A severe problem that has arisen in Egypt in recent years is blossom blight. It began in Alexandria and Beheira, and extended to the majority of orchards in Gharbia and Dakahliya governorates. The main symptom is sudden burning of the blossoms which extends to the nearby leaves and in a few cases to the bearing spurs. It was noticed that this phenomenon first occurs when the temperature reaches 20-25°c within one or two days after a rain. The infected blossoms and leaves are not shed during the year.

Pears (cont.)

Post Harvest Activities

Handling Technique: Pears are hand harvested into small bins w
they are mature. In the field, the harvested fruits are packe
in cardboard boxes and are transported to be kept in cold hous
for a considerable period to ensure good fruit quality.

Problems Faced: Picking and packing procedures need improvemer

Fruit Crop: Citrus

Total Acreage in Egypt: 365,160 feddans **Total Yield:** 2,477,918 tons
Average Yield: 6.79 tons/fd

Geographic Distribution: Citrus orchards are mainly found in Beheira, Qalubiya, Sharkiya, Ismailiya, Dakahliya, Gharbia, and Minufiya governorates.

Economic Value: 998,789,000 LE

Domestic Consumption: 886,750,358 LE

Standing in Economic Importance: 1

Cost to Produce: 2200 LE/fd Net Profit: 1386 LE/fd

Amount Exported: 81,090,971 kg @ 112,038,642 LE

Exported To: Most citrus exports are shipped to the former USSR and other East European countries.

The top ten recipients of Egyptian citrus are: The former USSR, Saudi Arabia, The United Kingdom, The Netherlands, Yugoslavia, Canada, Malta, Romania, South Yemen, and Belgium.

Varieties Used: The main citrus varieties grown in Egypt are:

Oranges	70% of total citrus. Varieties include Navel, Valencia, Succari (acidless), and Baladi.
Mandarins	Varieties include Baladi, Kelemantine, Sitsuma, and king mandarin.
Pummelos (grape fruit)	Varieties include March seedless, Duncan and Triumph.
Limes	Baladi (Mexican lime) variety.

Sour orange is the main root stock for the propagation of citrus varieties in Egypt. However, there are some newly introduced rootstocks such as volkamer lemon, swingle citrumelo, troyer citrange, rangpure lime and cleopatra mandarin. These newly introduced rootstocks are still under field study.

Pears (cont.)

Soil Conditions: Well drained light loamy soils are best for citrus growing. Citrus trees cannot grow well in alkaline soil The optimum Ph for citrus growing is from 6.5 to 7.5. The best rootstock for growing in sandy soils is still under study.

Cultivation

Fertilizers Used:

Organic Fertilizers

Manures are applied to the soil during December and January at 20-30 m^3/fd.

Chemical Fertilizers

As a general rule, citrus trees need yearly applications of nitrogen, phosphorus, and potassium, at the following rates (if 160 trees /feddan):

- 128 kg/fd nitrogen in February, May, and August
- 274 kg/fd potassium sulphate in February and August
- 80 kg/fd Super Phosphate in December/January with manure application.

With sandy soils, the above rates should be increased by 50%. Foliar sprays with micro elements should be conducted to overcome deficiencies in these elements, particularly in poor soils.

Irrigation Methods: In Egypt, three methods of watering are used in citrus orchards. Flood irrigation is mainly used in the Nile Delta. Number and timing of irrigation depends on the age of the trees, type of soil, and climatic conditions. Drip irrigation is used in some newly reclaimed areas, while sprinkler irrigation is used in others.

Important Insects: Some insects affecting citrus trees and fruits are: Mediterranean fruit fly, mealy bugs, white fly, scales, citrus rust mite, flat mite, and brown mite.

Important Diseases: Citrus diseases can be divided into two categories: viral and virus-like; and fungal. The most important viral and virus-like diseases are: stubborn disease, pserosis, and blind pocket. The most important fungal diseases are: brown rot gummosis, bark rot gummosis, black rot of navel orange, diplodic rot, and lichens.

Pesticides/Fungicides Used:

1. Dimethiute 40% for Mediterranean fruit fly
2. Actellic or Anthio for mealy bug
3. Actellic or Dimethiute for whit fly
4. Mineral oil for scales
5. Mineral oil plus Diathane M45 for citrus rust mite

Citrus (cont.)

6. Caltheme for flat mite and brown mite

Problems Faced:

1. There is a lack of registered citrus trees free of viral diseases for use as mother plants for citrus propagation.
2. There is a need for rootstocks that are suitable for use the newly reclaimed areas and tolerant to serious disease
3. The technology transfer practiced by the extension servic could be made more effective.
4. More research is needed on how to use the newly reclaimed areas for citrus production.

Post Harvest Activities

General Information: The harvest time for citrus varieties is as follows:

Navel orange	Mid-October through December
Mandarins	Baladi, from mid-November through May
Baladi & Succari oranges	Beginning of December through April
Valencia orange	May through August
Grapefruit	December through February
Baladi lime	Throughout the year

Handling Technique: Citrus fruits are picked into small plastic bins. In the field, the fruits are graded and packed in cardboard boxes for shipping to the outdoor market. For export, fruits are packed in plastic boxes and shipped to packing houses where they are graded and undergo other treatments. They are then packed in cardboard boxes.

Problems Faced: Exploration of new foreign markets for citrus is needed. New packing houses are needed and old ones should be improved in order to meet the requirements for export.

Fruit Crop: Peaches

Total Acreage in Egypt: 54,233 feddans **Total Yield:** 142,045 tc
Average Yield:4.3 tons/fd

Geographic Distribution: Peach orchards are found mainly in Dakahliya, Beheira, and North Sinai governorates.

Economic Value: 85,227,000 LE

Domestic Consumption: 84,576,678 LE

Standing in Economic Importance: 7

Cost to Produce: 1500 LE Net Profit: 1080 LE

Amount Exported: 473,914 @ 650,322 LE

Exported To: Arab countries make up the top five recipients of Egyptian peach exports: Saudi Arabia, Qatar, Bahrein, Kuwait. Other buyers are: The netherlands, Hungary, Germany, Austria, the United Kingdom, and Denmark.

Varieties Used: Before 1979, the majority of peach orchards we cultivated with a cling stone local peach cultivar, Mit Ghamr. In 1979, the MOA introduced many cultivars with low chilling requirements from the United States. Some of these cultivars have been very successful. They include: Florida Sun, Florida Prince, Desert Gold, and Earli Grand. The majority of peach orchards in Egypt are now growing the new imported cultivars.

Nematode injury to peach tree roots in Egypt had led to import: of some resistant rootstocks. The Nemaguard rootstock has bee: very successful in combatting this problem. Now, all new peac: cultivars grown in Egypt are grafted on Nemaguard rootstock, which produces vigorous tree with good anchorage.

Soil Conditions: Well-drained soils are best for optimum peach production. In Egypt, most peach trees are grown in light-textured and sandy soils. Peaches cannot grow well in heavy-textured and calcareous soils.

Peaches (cont.)

Cultivation

Fertilizers Used:

Organic Fertilizers:

Manure is applied to the soil at 15-20 m^3 per feddan in November.

Chemical Fertilizers:

Peach trees need a yearly application of nitrogen, phosphorous, and potassium. Rates of application per feddan for mature trees are: 80-100 kg of actual nitrogen, 110 kg potassium sulphate, and 100 kg super phosphate. The nitrogen and potassium fertilizers are added to the trees in one or two applications. The first Super phosphate is mixed and added with the manures in Winter.

The minor elements most commonly deficient are: zinc, iron, manganese, and magnesium. The deficiencies are best controlled through the use of foliar nutrient sprays throughout the growing season.

Irrigation Methods: Two irrigation methods are used in peach orchards. Flood irrigation is mainly used in the Nile Delta and drip irrigation is used mainly in newly reclaimed areas (sandy soils).

Important Insects: chafer, red mite, aphids, root knot nematodes

Important Diseases: gummosis of stone fruit trees, powdery mildew, peach leaf curl

Pesticides/Fungicides Used: The following pesticides are used:

1. Hostathion or Lannate for chafer
2. Tedefol for red mite
3. Malathion for aphids
4. Fumazine or Nemagone for root knot nematodes
5. Copper oxychloride or Bordaux mixture for peach leaf curl
6. Karathane and Rubigan for powdery mildew

Problems Faced:

1. Root knot nematodes pose a large problem.
2. Many growers do not know the proper time for harvesting their yield.
3. There is a lack of experience among growers in applying optimal agricultural practices.

Peaches (cont.)

4. Inadequate control of pests causes losses.

Post Harvest Activities

General Information: In Egypt, the early peach varieties can be picked from the end of March to the end of May, while the late local variety (Mit Ghamr) can be picked in late-July or August. Generally, all the early peach varieties grown in Egypt have poor storage quality, so their fruits must be harvested in the firm-ripe stage. Most of the peach varieties grown in Egypt are harvested very early.

Handling Technique: Peaches are harvested by hand into bags and then packed into crates made of palm leaves or cardboard boxes for the fresh fruit market. The peach grower's choice of when to pick his crop largely depends on how he intends to market it. The current trend is to pick more mature peaches than in earlier years, because their eating quality is better. If the peaches are to be transported by truck to local markets, they may be allowed to become nearly ripe on the trees. For shipping greater distances, most peaches are picked during the firm ripe stage.

Fruit Crop: Grapes

Total Acreage in Egypt: 153,698 feddans **Total Yield:** 693,089 to:
Average Yield:6 tons/fd

Geographic Distribution: Beheira, Gharbiya, Dakahliya, Minufiya Giza, and Minya governorates

Economic Value: 291,097,000 LE

Domestic Consumption: 291,063,595 LE

Standing in Economic Importance: 3

Cost to Produce: 1200 LE Net Profit: 1320 LE

Amount Exported: 15,702 kg @ 33,405 LE
Grape exports fluctuate from year to year according to the quantity of the yield and the demand for fresh fruits and raisins in the local market.

Exported To: The top ten importers of Egyptian grapes ar United Arab Emirates, Saudi Arabia, Kuwait, Qatar, Germany United Kingdom, Bahrein, Libya, Austria, and Sweden.

Varieties Used: There are two main grape varieties grown in Egypt: Thompson seedless and Roumi Red (a seeded variety).

In 1981, the MOA introduced the following grape varieties imported from the United States:

- Seedless table grapes
  Flame, King's Ruby, Emerald, Kishmish, Fiesta, Loos Perlette, Beauty, Delite, Superior, and Early Superio
- Seeded table grapes
  Italia, Gold, Ribier, Calmeria, Black Rose, Rozaki, Emperor, Cardinal, Rish Baba, Early Muscat, Exotic, a Queen
- Wine Grapes
  Grenach, Muscat Blanc, Ruby Cabernet, French Colombar Cabernet Sauvignon, and Palamino

In Egypt, the phylloxera insect is not present so it is not possible to propagate all the grape varieties by stem cuttings. However, recently the MOA introduced some American rootstocks that may be used if the phylloxera insect is introduced. The rootstocks are: Dog Ridge, LN33, Kober 5BB, Richeter 110,

Grapes (cont.)

Freedom, Harmony, Richeter 99, Couderc 1616, and Oppenheim 41B.

Soil Conditions: Deep sandy loam soils that are free from salinity and have good drainage are the best for optimal grape vine growth and production. Adequate growth and production can be obtained on sandy soils and in fairly calcareous soils as well.

Grapes (cont.)

Cultivation

Fertilizers Used:
Organic Fertilizers
Manures are applied to the soil during December and January at after the time of pruning. The rate of application is 15-20 m^3 per feddan.
Chemical Fertilizers
Generally, the yearly application of chemical fertilizer per feddan of grapes (800-1000 vines) is as follows: 80-100 kg pure nitrogen, 100 kg potassium sulphate, 50 kg magnesium sulphate, kg sulfur and 100 kg of super phosphate.

The minor elements most commonly deficient (especially in sandy soils) are: zinc, iron, and manganese. This is be corrected by using foliar sprays during the growing season.

Irrigation Methods: Flood and drip irrigation are the two methods used for applying water in vineyards. Flood irrigation is used mainly in the Nile Delta, while drip irrigation is used in the newly reclaimed areas (sandy soils).

Important Insects: mealy bugs, mites, grape moth, grapevine thrips

Important Diseases: powdery mildew, downy mildew, botrytis rot berries, alternaria rot of berries, root knot nematodes

Pesticides/Fungicides Used: The following chemicals are used:

1. Actellic or Anthio for mealy bugs
2. Tedefol for mites
3. Gardona or Actellic for grape moth
4. Mineral oil for scales
5. Morocid and Topsin for powdery mildew
6. Super David Ridomil for downy mildew
7. Rovral for alternaria rot and botrytis rot of berries
8. Vydate or Furdan for root knot nematodes

Problems Faced:
1. The materials required (sticks and trellis) for establishing vineyards with new methods of training (Y shape and telephone systems) are very expensive.
2. There is a shortage of laborers skilled in applying vine pruning systems.

Grapes (cont.)

3. Growers often apply fertilizers in incorrect amounts.
4. Over cropping often occurs because of the large numbers of fruit buds left on the vine during the winter.

Post Harvest Activities

General Information: The Thompson seedless variet s harveste in early June, while the Roumi Red variety is har sted at the end of October.

Handling Technique: Grape bunches are hand harvested, trimmed packed in cardboard boxes before being shipped to the market. Some growers prefer to store their crop (especially the Roumi variety) in coolers at 0°c and 90% relative humidity to get higher prices.

Fruit Crop: Bananas

Total Acreage in Egypt: 37,620 feddans **Total Yield:** 452,186 tons
Average Yield: 13 tons/fd

Geographic Distribution: The main areas for banana production are Minufiya, Qalubiya, Assiout, Sohag, and Qena governorates.

Economic Value: 429,577,000 LE

Domestic Consumption: 429,577,000 LE

Standing in Economic Importance: 2

Cost to Produce: 1st year:4000 LE subs.yrs.:2000 LE
Net Profit: 1st year:2000 LE subs.yrs.:6000 LE

Amount Exported: 486 kg @ 494 LE

Exported To: The small number of bananas that are exported from Egypt are sold in port to supply foreign ships.

Varieties Used: In Upper Egypt (Assiout, Sohag, and Qena), the main cultivar is Hindi (Cavendish) in addition to a smaller area of Williams cultivar. In Lower Egypt (Minufiya and Qalubiya), Maghraby, Hindi, and Williams are all wide-spread. Other banana varieties in Egypt include: Bassrai, Green Bombay, and Paradica. Hindi, Bassrai, and Green Bombay are short cultivars, varying between 1.5-2.0 meters in length, while Maghraby and Williams are long cultivars, reaching about 3 meters in length.

Soil Conditions: The well-drained clay soils of the Nile River Valley are the best type for banana orchards, while heavy-textured soils should be avoided. However, adequate growth and production can be obtained on sandy soils.

Cultivation

General Information:

Fertilizers Used: In relation to other fruit crops, bananas require a considerable amount of mineral nutrients to obtain a good crop. In Egypt, banana fertilization is as follows:

Organic fertilization:

Manures should be applied in November and December at a yearly rate of 60 m^3 per feddan.

Chemical fertilization:

Bananas require a high rate of nitrogen and potassium, so they are applied eight times at monthly intervals from March to October. They are applied at the following rates: 300 gm actua nitrogen and 250 gm KO_2 per plant per year, and 90 gm P_2O_5 per plant per year with the manure application in November and December.

Irrigation Methods: Furrow irrigation is the main type of irrigation used in the Nile Valley and Delta, while drip irrigation dominates in the newly reclaimed areas with their sandy soils.

Important Insects: banana aphid

Important Diseases: bunchy top, mosaic, heart rot, cigar end rc burrowing nematodes

Pesticides/Fungicides Used:

1. Nemacore, Vydate or Furdan for burrowing nematodes
2. Malathion for aphids.

Problems Faced:

1. There is a lack of information among banana growers regarding orchard-cultural practices (pruning, fertilization, irrigation).
2. There is inadequate pest control in banana orchards. The problem is especially serious in the case of banana aphids which cause bunchy top disease and burrowing nematodes wh are found mainly in sandy soils.

Post Harvest Activities

General Information: In Egypt, the time from planting to harvesting is about 18 months. The time from shooting to harvesting is 3-5 months, and the stage of maturity is 80-90 days from shooting time. The average life of a banana orchard is 15-20 years.

Handling Technique: Harvest time for bananas is from mid-October to Mid-May, depending on the variety. The best time to export bananas is from January to April. Bananas are harvested when they are mature but not quite ripe.

For export, the banana bunches are covered with plastic bags and placed in boxes covered with green banana leaves. Each box contains only one bunch.

For the local market, bunches are placed in closed chambers with the temperature at 17°c in an atmosphere of acetylene gas. The fruit ripens within 2-3 days and the bunches are transported to the market.

Fruit Crop: Figs

Total Acreage in Egypt: 3974 feddans **Total Yield:** 151,107 tc
Average Yield:6.2 tons/fd

Geographic Distribution: Fig orchards are mainly found in Alexandria, Beheira, Fayoum, and Minya governorates.

Economic Value: 113,442,000 LE

Domestic Consumption: 113,430,696 LE

Standing in Economic Importance: 6

Cost to Produce: 2,514 LE Net Profit: 2,137

Amount Exported: 6,000 kg @ 11,304 LE

Exported To: Libya and foreign ship supply

Varieties Used: All fig cultivars grown in Egypt belong to the common fig variety, which sets its fruit parthenocaprically an bears two crops per growing season. The first crop (berba) is produced from fruit buds that lasted through the Winter and matures in May or June. The second crop (main crop) is produc in leaf axils of Spring and early Summer shoot growth and matu in August and September.

The major local variety is Sultani, which produces two crops p season. The first one matures in June and the second one in August. Some other varieties are grown in small areas. They are: Red Adsy, Abbandy, White Aswan, White Adsy, and Kahramani In 1981, the MOA introduced some cultivars of dried figs: Kado Conadria, Doretto and Black Mission. These new varieties are grown successfully in the newly reclaimed areas especially in sandy soil.

Soil Conditions: Fig trees can grow in a wide range of soils f sand and clay soils to calcareous soils.

Figs (cont.)

Cultivation

Fertilizers Used:

Organic Fertilizers:

A soil application of manure is made in December at a rate of 20 m^3 per feddan.

Chemical Fertilizers:

As a general rule, fig trees need yearly applications of nitrogen, phosphorous, and potassium. Rates of application for mature trees are 300-500 gm actual nitrogen and 500-1000 gm potassium sulphate per tree. Phosphorous application is added as super phosphate at 450 gm/tree during December mixed with manure.

Irrigation Methods: Figs thrive under conditions of low relative humidity, intense sunshine and hot temperatures during the Summer months. Two methods of applying water are used in fig orchards. Flood irrigation is used mainly in the Nile Delta, while drip irrigation is used mainly in newly reclaimed areas. In some locations in Mersa Matrouh governorate, fig trees may produce crops without irrigation, but production is low and fruit quality is impaired.

Important Insects: fig shoot borers, red mites, fig fruit fly, root knot nematodes

Important Diseases: fig tree rust, lichens

Pesticides/Fungicides Used:

1. Cidial L50 for fig shoot borer
2. Kalthane for red mites
3. Hostathion for fig fruit fly
4. Bordaux mixture for fig tree rust
5. Copper oxychloride for lichens

Problems Faced:

1. Many growers do not follow the recommendations for pruning and fertilization of fig trees.
2. There is inadequate pest and disease control.

Post Harvest Activities

Handling Technique: Fresh fruits of local varieties are hand-picked from trees as they become fully ripe and while they are still firm. They are sorted remove unacceptable fruits (bi: pecked, sunburned, split, sou..d, and insect-infested). Following sorting, the fruits are placed in small crates for delivery to the fresh market. Fresh figs are highly perishabl so it is extremely important to transport the yield to the mar without delay.

Problems Faced: Lack of cold storage facilities in the markets result in a high percentage of fruit losses.

Fruit Crop: Mangoes

Total Acreage in Egypt: 53,449 feddans **Total Yield:** 159,333 tons
Average Yield:4 tons/fd

Geographic Distribution: Mango orchards are found mainly in Sharkiya, Ismailiya, Giza, and Fayoum governorates.

Economic Value: 199,166,000 LE

Domestic Consumption: 198,983,111

Standing in Economic Importance: 5

Cost to Produce: 2,400 LE Net Profit: 2,596 LE

Amount Exported: 166,890 kg @ 182,889 LE
Mango exports fluctuate from year to year depending on the yield and local market demand.

Exported To: The top ten importers of Egyptian Mangoes are: Saudi Arabia, Kuwait, Libya, United Arab Emirates, Austria, the United Kingdom, Qatar, Bahrein, France, and Germany.

Varieties Used: There are many local varieties of mangoes grown in Egypt. They can be divided into two groups: those with a single embryo in each seed and those with two or more embryos in each seed. The single embryo varieties include: Pieri, Alfons, Malgoba, Mabrouka, and Dabsha. The multi-embryo group includes: Hindy, Tymore, Zibda, Misk, Golek, and Koubania. Fruit maturity begins earlier in Upper Egypt (end of June) than in Lower Egypt (late-July to late-September). The alternate bearing phenomena is very obvious in most mango varieties.

Soil Conditions: Deep sandy loam soils that are free from salinity and have good internal drainage are the best for optimal mango growth and production. Adequate growth and production can be obtained in sandy soils as well.

Cultivation

Fertilizers Used:

Organic Fertilizers:

Manures are applied to the soil during December - January at 1 m^3 per feddan.

Chemical Fertilizers:

Generally, the yearly application of chemical fertilizers for a single mango tree is as follows: 200-400 gm of pure nitrogen, 500-1000 gm potassium sulphate and 750 gm super phosphate.

Irrigation Methods: Flood and drip irrigation are the two metho used for applying water in mango orchards. Flood irrigation is used mainly in the Nile Delta, while drip irrigation is used in the newly reclaimed areas (sandy soils).

Important Insects: powdery bug, scales, Mediterranean fruit fly Mango rust acaride

Important Diseases: powdery mildew floral malformation disorder

Pesticides/Fungicides Used:

1. Mineral oil plus Malathion 57% for scales and mealy bug
2. Dimethiute 40% for Mediterranean fruit fly
3. Micronic sulfur for mango rust acaride
4. Morocid and Nemrode for powdery mildew

Problems Faced:

1. Alternate bearing phenomena poses problem for growers.
2. Frost poses a threat to mangoes in the Winter.
3. Floral malformation disorder poses a serious problem.
4. There is inadequate control of pests.

Post Harvest Activities

Handling Technique: Mango fruits are hand harvested at maturity. It takes 90-150 days from blooming to fruit maturity.

For the local market, the harvested fruits are packed in crates made of palm leaves, while for export, the fruits are graded and packed into cardboard boxes.

The storage capacity of mango fruits differs from one variety to another. Generally, the mango fruits can be stored at 40-50°F and relative humidity 85-90%.

Aromatic and Medicinal Crops
Introduction

Aromatic and medicinal plants in Egypt show great potential. Medicinal plants are numerous both in the Nile Valley and in desert regions like Sinai and the Western Coast. The total are of aromatic and medicinal plants is about 50,000 feddans per year, but the areas for each crop fluctuate a great deal from year to year. This may be caused by one or more of the followi factors:

- The prices and marketing conditions of one season are reflected in the area planted in each crop the following season.
- There is a lack of information about demand in foreic markets.
- There is a lack of industrialization for extraction c the oils from these crops.

The top five aromatic and medicinal plants cultivated in Egypt terms of area cultivated are listed below.

	Commodity	Area (feddans)	Average Yield (tons/fd)	Net Revenue Feddan**
1	Coriander	18,500	0.843	1,570
2	Chamomile	10,000	0.758	3,410
3	Cumin	4,980	0.534	2,590
4	Geranium	4,844	8.302	2,952
5	Caraway	3,000	1.034	1,640

The average yield and area for each crop could be increased significantly if contracts or insurance were available for the grower so that he could be certain of selling his crop at a goc price before he makes the large investment necessary for cultivation.

Although aromatic and medicinal crops have been grown for sevei hundred years, they still represent a new area in today's

** If optimal inputs were used

Aromatic and Medicinal crop: Geranium (Pelargonium)

Total Acreage in Egypt: 4844 feddans **Total Yield:** 40,216 tons
Average Yield: 8.302 tons/fd oil 25 kg/fd

Geographic Distribution: Geranium cultivars are concentrated mainly in two governorates in Middle Egypt: Beni Suef (80% of total area) and Fayoum (15% of total area). Most of the remaining 5% is located in El Minya, Qalubiya, and Giza.

Economic Value:

Domestic Consumption:

Standing in Economic Importance: 3

Cost to Produce: 760 LE/fd Net Revenue: 2952 LE

Amount Exported:

Exported To:

Uses: Geraniums were introduced in Egypt in 1930 by a French grower who cultivated them in Shubra near Cairo. Geraniums are planted for their essential oil, which is used in the perfume and food industries. Also, the oil is used to substitute for the more expensive rose oil. The oil is used for its sweet tenacious rose-like odor, and most of the oil produced is exported.

Growing Season: Geraniums are perennial plants. They can live for five to six years in mild warm weather. In Egypt, geraniums are cultivated at two times: the second half of October and mid-February to mid-March.

Varieties Used: Three main varieties of geranium are prevalent in Egypt and all belong to the pelargonium species:

Baladi geranium	--	pelargonium graveolens
Lymoni or etre shah	--	pelargonium radula
Kafouri geranium	--	pelargonium fragrans

The varieties are distinguishable by their odor and the morphology of vegetative growth. The Baladi variety is more prevalent than the other two.

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Economic Value:

Domestic Consumption:

Standing in Economic Importance: 3

Cost to Produce: 760 LE/fd **Net Revenue:** 295

Amount Exported:

Exported To:

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The varieties are distinguishable by their odor and the morphology of vegetative growth. The Baladi variety is more prevalent than the other two.

Soil Conditions: Well-drained loamy soil is the best for geranium cultivation. Growth and oil yield are reduced in heavy clay soils and with high moisture conditions. Light soils result in a high percentage of volatile oil.

Cultivation

General Information:
With the Egyptian climate, geranium plants are unable to produ seeds, so cuttings are taken from the mother plants. To cultivate one feddan in geraniums, 20-25 thousand cuttings are needed. Cuttings should:

- be 20 cm in length
- have four to six lateral buds
- be one cm or more in thickness
- preferably be terminal cuttings
- be from mother plants that are free from disease
- be from mother plants that were not irrigated for or month before taking the cuttings.

To increase the percentage of plants that survive in the fielc cuttings can be placed in a nursery for rooting and transplant into the permanent field later. This method shortens the time vegetative growth in the field.

Geranium cuttings or seedlings are cultivated in rows 60 cm ir width. The distance between cuttings is 25 cm and they are planted on one side of the row in the presence of water.

Fertilizers Used: Fertilization with 30 kg P_2O_5, 60 kg N, and kg K_2O per feddan for each herb cut is recommended. This mear that these quantities should be added twice each year. Also, nitrogen fertilizers are divided into to equal doses, the firs dose with potassium fertilizer 45 days after transplanting anc the second dose one month later as ammonium sulfate. Superphosphate is usually added at the time of soil preparatic

Irrigation Methods: The essential parts of the geranium for oi are the leaves and the new shoots, so encouraging vegetative growth through frequent irrigation and the use of fertilizers will result in a high yield of herbs and oil.

Irrigation each 8-10 days in the Summer or 15 days in Winter v achieve good vegetative growth, but plants grown in light soil will need shorter intervals than those in heavy soils. Care r be taken not to irrigate too much, because increased soil moisture can result in verticillium wilt. Halting irrigation before cutting the herbs will decrease the water content in tl leaves and increase the efficiency of distillation. Using the

Geranium (Pelargonium) (cont.)

recommended intervals, 200-250 M^3 of water are sufficient for geraniums.

Pesticides Used: The major threat to geranium plants is parasite plants such as orobanche and dodder. To control these parasites, soil that is infested with them should be avoided when choosing a site. Once the parasites are present, they can be controlled with early mowing and grazing.

Geraniums are also subject to verticillium wilt. Following two to three year rotation, controlling irrigation, and soaking the cuttings in fungicide solution consisting of 1 gm Benlite and 2.5 gm Diathane/L for five to ten minutes will help to control this disease.

Problems Faced: Egyptian geranium growers face the minor problems of high labor costs and unsubsidized chemicals and fertilizers.

Post Harvest Activities

General Information: Growers cut geraniums twice a year. The first cut is obtained during the period between late-April and late-July when 50% of the plants are in the flowering stage. This is the yield of Winter season or of the new plantings whi were cultivated for the first time in October. The second cut occurs in September and October. The plants are not flowering this time, but the yellow color of the leaves indicates the ti for harvesting.

Handling Technique:

Distillation

The volatile oil of the geranium is obtained through the steam distillation. This process can be done in the villages using very simple apparatus with a capacity of several kilos of herb or in companies with large units with capacities of .75-1 ton herbs. Leaving the cut plants 12 hours before distillations g the best results in terms of oil yield.

Oil Yield

The first cut in May-June represents 2/3 of the total oil yiel while the second cut represents 1/3. Generally, each 800-1000 of herbs produce one kg of volatile oil. The quantity of oil extracted depends on several factors: the type of soil, relati humidity, and age of plants. The percentage of oil produced increases gradually during the first three years and then declines.

Problems Faced: The main problem facing geranium growers is inadequate information about the demand for exports. It is difficult to predict the quantities that will be required and price that will prevail in the market, Contracts between exporters and growers can be a base for solving this problem. Without ensuring a minimum selling price, geranium cultivation very risky.

Aromatic and Medicinal crop: Cumin (cumin cyminum)

Total Acreage in Egypt: 4980 feddans **Total Yield:** 2,660 tons
Average Yield: .534 tons/fd

Geographic Distribution: Cumin is cultivated mainly in Upper Egypt, where nearly 2/3 of the total area cultivated in cumin is found. Most of this 2/3 is in Assiout governorate and some tens of feddans are located in Sohag and the nearby governorates. The last 1/3 is cultivated in Middle Egypt, mainly in Minya with a few feddans in Beni Suef.

Economic Value:

Domestic Consumption: 18,675,000 LE

Standing in Economic Importance: 2

Cost to Produce: 510 LE/fd Net Revenue: 3240 LE/fd

Amount Exported: 41,066 kg @ 84,448 LE

Exported To: Canada, U.S.A, Saudi Arabia, Germany, and Libya

Uses: Cumin is an annual herb and has grown for centuries in the Mediterranean region, chiefly in Egypt, Morocco, Malta, and Syria. The parts used are the fruits, which are very aromatic and contain 2.5-5% essential oil. Cumin acts as a carminative, and stimulates digestive secretions and lactation. It has been proven effective in the treatment of dyspepsia, colic and flatulence. The volatile oil is used in the perfume industry.

Growing Season: Cumin is cultivated in Winter season in locations where the rainfall is low, such as in Upper Egypt. The appropriate time for sowing cumin is throughout October and the beginning of November. Early sowing gives a higher yield than late sowing.

Varieties Used: n/a

Soil Conditions: Cumin is cultivated in different types of soil, but the best is loamy, or silt loam. In all cases, the soil should be well-drained, with a deep water table and no salinity. Plants where there is a shallow water table or inefficient drainage system are subject to wilt diseases.

Cultivation

General Information:

To cultivate one feddan of cumin, 5-6 kg of weed-free seeds are sufficient. Cumin seeds are sown in rows 60 cm in width on one side of the row. It is preferable to sow the seeds on the eastern or southern side of the rows. The seeds are placed in hills 25 cm apart and in the upper third of the rows. In each hill, 3-5 seeds are sown and covered with a thin layer of soil. After germination, thinning will occur gradually until only two seedlings remain.

Fertilizers Used: Well decomposed organic manure at a rate of 15-20 m^3 at soil preparation is very effective for improving the vigor of vegetative growth. Chemical fertilizers are added at the following rates per feddan:

60-80 kg N	as ammonium sulphate
15-30 kg P_2O_5	as superphosphate
25 kg K_2O	as potassium sulphate

The entire quantity of superphosphate and potassium sulphate plus half of the ammonium sulphate are added one and a half months after sowing and before the first irrigation. The second half of nitrogen fertilizer is added at the beginning of flowering in January.

Irrigation Methods: Cumin plants are very sensitive to irrigation. They need irrigation only three to four times during the growing season. The first irrigation occurs 45 days after sowing the seeds and the application should be very light. For each irrigation, 150-200 m^3 of water is sufficient. Increasing soil moisture especially at the flowering stage results in decreases both in growth and in volatile oil percentage.

Posticides Used: Cumin plants are very soft and thin at the first stage of growth, so weeds are strong competitors for the plants and should be cleared by hoeing. Also, there is a weed called plantage that resembles cumin in shape. It should be excluded from the field early to ensure high quality grains.

In terms of diseases, the most important ones are verticillium and fusarium wilts, which present serious problems. It is easy to control wilts by adding one to two grams of suitable seed fungicide for each kilogram of seeds before sowing and adjusting

the quantities and intervals of irrigation. Excess water is a major factor behind the infection of plants.

Problems Faced: The main problem facing cumin c wers is wilt disease. Avoiding soils infested with such fu .l diseases an heavy soils or areas with a high water table, d controlling irrigation can help to prevent wilt disease.

Cumin (cumin cyminum) (cont.)

Post Harvest Activities

General Information: Cumin plants flower in January in Upper Egypt and the fruits reach maturity in March and April. When the plants have reached 85-90% maturity, they are completely cut at the surface level in the early morning. They are collected in bundles with bands and transferred to a clean place. The bundles are placed upside down to dry and are cleaned after threshing. One feddan can yield from 400-800 kg dry grains.

Handling Technique: The cumin oil extracted makes up 2-3% of the dry seeds. Extraction is carried out with steam distillation with a simple apparatus or with chemical solvents such as petroleum ether or hexane which must go through another process to obtain the pure oil.

Problems Faced: The majority of cumin is consumed locally. Opening foreign markets for cumin grains and oil will encourage the grower to increase the cultivated area and improve prices, especially now that new technology in packing is available in Egypt.

Aromatic and Medicinal crop: Chamomile (Matricaria chamomilla

Total Acreage in Egypt: 10,000 feddans **Total Yield:** 7,580 ton
Average Yield: 758 kg/fd (700 kg/fd/harvest with seedlings and 1000 kg/fd/harvest with direct seeding)

Geographic Distribution: 95% of the area cultivated in chamomi is found in Middle Egypt. Fayoum governorate has 7000 feddans cultivated in chamomile per year, representing 63% of the tota area. Giza represents 32%, with 3500 feddans, and 600 feddans are located in Assiout.

Economic Value:

Domestic Consumption: 52,800,000 LE

Standing in Economic Importance: 1

Cost to Produce: 1290 LE/fd Net Revenue: 3420 LE/

Amount Exported: 3000 kg @ 19,800 LE

Exported To: Saudi Arabia

Uses: Chamomile can be used in its various forms as an antispasmodic, to treat maladies of the digestive track, as a vulnerary, to treat the symptoms of allergies, and to treat inflammation of the skin.

Chamomile can be used internally or externally. Internally, i is used in treating digestive disorders, even in infants, as a component of herbal teas that are used to promote the flow of gastric secretions and bile and in the treatment of colds.

Chamomile is cultivated mainly for its essential oil, which ma up 1% of the flower.Externally, the essential oil is used for anti-inflammatory action on skin and mucous membranes. It is used as an ingredient in douches, compresses and baths. Blue chanazulene and bisabplol are the medicinally effective ingredients in the oil which can be used for treating fever, a disinfectant, and as an antispasmcdic. Secondary substances i the oil can be used to stimulate sweat glands.

Growing Season: Chamomile is a Winter season crop and is cultivated mainly with seedlings. Seeds are sown in the nurse at the end of August or the beginning of September, and are re to be transplanted 40-45 days later in October. Early planti in the nursery is recommended, because the yield will be obta

earlier and it will be easier to avoid powdery mildew infestation.

Varieties Used: The chamomile cultivated in Egypt is German Chamomile or Matricaria chamomilla.

Soil Conditions: Light clay or silty soils are the best for chamomile cultivation. However, chamomile can grow in sandy soil if the proper organic and inorganic fertilizers and sufficient water are available. Chamomile can grow in saline soil with up to 12,000 ppm salt.

Chamomile (Matricaria chamomilla) (cont.)

Cultivation

General Information:

Nursery sowing

One feddan of chamomile requires 20,000 seedlings, which can be produced using 120-150 gm of seed. The seeds are sown in small plots 1.5 x 1.5 m in soil free form weeds and clumps. These small plots are well-watered and then any standing water is allowed to drain. The seeds will adhere to this saturated soil. The nursery should be protected in hot weather by shading, especially in the early stages.

Seedlings are transplanted in 60 cm wide rows, on one side, and at the upper third of the rows. The distance between plants is 30 cm. Water is used at the time of transplanting.

Direct seeding

Intensified chamomile planting can be done by sowing the seeds directly in the permanent fields. A greater quantity of seeds required with this method (750-1000 gm/fd). The field is divided into small plots of 120 x 120 cm to allow easy collecti of flowers. It is preferable to mix the seeds with fine sand t facilitate distribution of seeds on the whole area. The proportion of seeds to sand in 1/5.

The advantage of direct seeding is that the yield is at least 4 higher than in rows. Also, flowering is earlier by one month with direct seeding.

Fertilizers Used: The recommended rates of fertilizer per fedda are:

60 kg N	as ammonium sulphate
30 kg P_2O_5	as super phosphate
25 K_2O	as potassium sulphate

The entire quantity of super phosphate and potassium sulphate a added with 1/3 of the ammonium sulphate 3-4 weeks after transplanting or 45-50 days after direct seeding. The rest of the nitrogen fertilizer is added in 3-4 doses throughout the growing season.

Irrigation Methods: Three to five days after transplanting seedlings, the plants should be irrigated. Chamomile plants ne a lot of water. Throughout the season, they requi 12 (bi-weekly) irrigations. Water deficiency or dry soil 11 decreas the quantity of flowers. Irrigation (intervals and quantities should be increased in sandy or clay soils and in hot weather. One feddan of chamomile requires 150-200 m^3 water in the first

Chamomile (Matricaria chamomilla) (cont.)

irrigations and 350 m^3 from the flowering stage on.

Pesticides Used: Powdery mildew is the most serious fungal disease that attacks chamomile plants and decreases the quantity of flowers. Heavy infection causes defoliation and drying. To protect plants, three applications of Karathane WP 60 gm/100 L of water with 15-20 days interval. It is preferable to spray the shady place in which flowers are dried with insecticide such as actellic to repel any insects which may infest the drying flowers.

Problems Faced: Labor cost for harvesting flowers are very high, as 8-9 harvests are required. Children are usually used for this labor, but some of the harvests occur during the school year. There is a comb-like tool that can be used to collect the flowers, but still a more efficient and quick method for collecting flowers is needed.

Post Harvest Activities

General Information: Chamomile is harvested from the end of December until the end of April or the first of May. There ar 8-10 harvests each season. The appropriate stage of the flowe for harvesting is when the petals form a straight line with th horizontal axis.

Handling Technique: Chamomile flowers are air-dried on wire sieves. The flowers are exposed to direct sunlight on the fir day to evaporate a reasonable quantity of water, but on the second day they should be moved to an open shady place. The optimum temperature is 20°c. Increased temperature results in loss of volatile oil. The flowers are dried in thin layers an the stalks should not exceed 1/2 cm in length.

Problems Faced: As with many medicinal plants, chamomile faces uncertain demand. A good study of demand for exports and contracts between growers and buyers may help to encourage increases in the area cultivated in chamomile by reducing the farmers' risk.

Meat and Animal Production in Egypt

A variety of meat and animal products are available in Egypt, but production of most animal products does not meet local demand. On Average, per capita consumption of animal products in Egypt is as follows: 9.7 kg red meat, 48 kg milk, 6 kg poultry, 4.9 kg fish, and 4 kg, eggs.

Egyptians prefer red meat to poultry, and beef to other types of red meat. In all cases there is a preference for fresh rather than frozen meat. In 1990 and 1991, because of the price of corn, a main part of poultry feed, poultry purchases have decreased while beef purchases have increased. Recently, the effective price of cattle raising has increased, so poultry purchases are expected to increase.

Commercial enterprises produce a large percentage of Egypt's beef, dairy and poultry, but a significant percentage is still produced by smallholders. Sheep and goat production is almost completely with smallholders, and as the government has never become involved in subsidizing any area of sheep or goat production, it is the least developed livestock sector. With all of the ruminants, extension services are difficult to provide because there are large numbers of smallholders spread over a wide area.

The major constraint for animal production in Egypt is feed. There is no permanent grazing area in Egypt because of the small land base, so most animals have to be fed in confinement. Much of the grain required for feed is imported, and required roughage is difficult to obtain. While cattle feed is subsidized, the quality is not high enough for calves to reach optimal slaughter weight in one season. The high price of corn for poultry feed has resulted in farmers substituting other types of feed that are often less suitable. Farmers who raise chickens have begun favoring layers over broilers, as the profit is higher.

Fruits Introduction (cont.)

Livestock: Beef

Total Animals in Egypt:
Beginning Stock: 6,408,000 (4,235,000 dairy)
Production of Calves: 2,540,000

Number of Animals Slaughtered: 2,244,000 (loss 311,000)

Yield: 426,000 tons meat

Geographic Distribution: Both cattle and buffalo are located a over Egypt.

Economic Value:

Domestic Consumption: 511,000 tons @ approx. 3,662,166 L

Conversion Ratio: 12 tons feed/1 ton meat

Cost of Feed: 360 LE/ton Farmgate price: 4.30 L livew

(Dressed weight = 55-60% of liveweight)

Amount Exported: 0

Exported To: n/a

Breeds Present: Most of the beef producing animals in Egypt a either baladi cattle or buffaloes, but there are over 500 cow commercial dairy farms that are holsteins or frisians.

Special Conditions: Until 1992, the National Buffalo Program affected almost every aspect of beef production in Egypt. Sm farmers contracted with the government to produce calves. Th farmers were able to get loans from PBDAC to buy subsidized r replacers and calf starters. All of the calves were vaccinat and insured.

The MOA bought the calves at 200-250 kg liveweight and contra with buffalo feeders to fatten them. The feeders only paid of the average value of the animals and received subsidized unified feed for 300 days.

Fruits Introduction (cont.)

In 1992, the program ended. Although there are plans to continue the program with foreign funding, it is unclear how large the new program will be and whether it will provide all the same types of assistance that the National Buffalo Program provided.

Beef (cont.)

Animal Production

General Information: Ninety percent of the cattle and buffalo i Egypt are owned by small farmers. New methods of cattle breeding/herd improvement such as artificial insemination and embryo transplants are rarely used.

Diseases and Prevention: It is estimated that 40% of Egypt's he is infected with brucellosis. This disease is one of the cause of low fertility. Other diseases include: lumpy skin disease, foot and mouth disease, cattle plague (rinder pest), and blackl disease.

The government runs a vaccination program that has helped to reduce disease. The vaccines for foot and mouth disease and rinder pest are provided free of charge.

Method of Feeding: Cattle and buffalo are fed in confinement.

Feed Used: Baladi calves are usually weaned when they are 90 da old. At the end of the berseem season, they are sold in local markets or to cattle dealers who deliver them to feedlots for fattening.

There are two main types of feed used in Egypt:

- Unified feed (.5 mil tons/yr) = 48% wheat, 20% corn, 10% cottonse meal, 5% rice bran, 5% rice hull: 2% rice germ meal, 5% molasses, limestone, 2% salt.

- Free Market Feed (1.8 mil tons/yr) = 33% wheat bran, 15-25% corn, 10% cottonseed meal, 25-50% farm by-products (rice straw, rice hulls, beans, straw, barley straw), 5% molasses, 3% limestone, 2% salt.

Both of these feeds cost 360 LE/ton and gains of 650 gm/day ca be expected. With this feed and only one rotation per year, t animals cannot reach the proper slaughter weight of 450 kg liveweight.

The public sector is now producing two kinds of improved compo feed: regular traditional feed (14-16% protein) which sells fo 350 LE/ton and high protein feed (22% protein) which sells for

Beef (cont.)

425 LE/ton.

Problems Faced:

1. Quality feed is in short supply. The ruminant feed mill industry produces about 2.25 million tons, operating at only half its capacity. This is because the industry is based on supplying by-products and also because there is not enough grain.

2. There are no permanent pastures in Egypt because of the limited amount of fertile land, so cattle must be fed in confinement.

3. There is a small supply of roughage. Roughage often costs more than feed in the Summer.

4. There have been major improvements in commercial feedlots in terms of nutrition, animal health and breeding, but small farmers are not aware of new advances in these areas. It is difficult to provide extension because there is a large number of small-holders.

5. Because of disease and feed problems as well as poor animal husbandry, calf mortality is high: 20-25%

6. Low fertility is also a problem, at 70% for cattle and 60% for buffaloes.

Slaughter and Marketing

General Information: In Egypt, the consumer generally prefers beef to other types of meat and prefers fresh meat to frozen. Much of the red meat purchased is used in stews, however, so th quality of the meat is of less important to the consumer than t price. Because beef is more expensive than other types of meat most people who buy it are from the more affluent classes. Recently, beef liver, hamburger, and sausage have become more popular.

Handling Technique: Fifty percent of the cattle and buffalo slaughtered and 60% of the calves slaughtered are slaughtered o farms or in villages. There are 355 slaughter houses in Egypt, with total capacity 1.2 million head. Most of the slaughter houses are small (one-room), but there are eight industrial facilities in Cairo and Alexandria that make up for 40% of tot animals slaughtered. The World Bank constructed nine modern slaughter houses, but they do not operate at full capacity because there are not enough animals to warrant running the rending plant, and they have met resistance from traditional butchers. There is one modern private sector slaughter house Ismailiya that processes 150 head/day.

Problems Faced:

1. The production of meat is not distributed evenly throughou the year. The National Buffalo Program was the main meat supplier, and they produced 200,000 head for slaughter in October-December only.

2. There is a lack of good packaging, sanitation, and quality control in meat packing and slaughtering.

Livestock: Dairy

Total Animals in Egypt: 4,235,000 dairy cows, 1,400,000 in milk

Yield: cows' milk	685,000 tons	Fluid use	578,000 tons
other milk	1,455,000 tons	Factory use	1,454,000 tons
		Feed use	125,000 tons

Geographic Distribution: Dairy cattle are located all over Egypt.

Economic Value:

Domestic Consumption: 2,157,000 tons milk
3,000 tons butter
293,000 tons cheese

Conversion ratio: .28 kg starch equivalent/1 kg milk
1 kg feed/.5 kg starch equivalent

Cost of Feed: 360 LE/ton

Farmgate Price: 0.70 LE/kg for cow's milk
1.00 LE/kg for buffalo milk
(average 0.75 LE/kg)

Amount Exported: 0

Exported To: n/a

Breeds Present: Buffaloes make up 55% of the dairy herd, but produce 68% of the milk. The rest of the cows are mainly local baladi variety, although there are some modern dairy farms that have 500+ head of imported holsteins and frisians.

Animal Production

General Information: Milk production for buffaloes is 1.2 tons/head lactation which is low, but the milk contains 7-8% fa and consumers prefer it to cow's milk. Buffalo mi is more expensive too. Local baladi cows produce .75 tons head. The imported varieties have higher production: frisians 4 tons/head and holsteins 5.5 tons/head.

There are three systems used for raising dairy cattle in Egypt:

1. Small-scale mixed farms: 90% of dairy cows and buffa are raised on small farms with an average holding of three feddans. These small farms account for 72% of the milk production in Egypt. Each farm has 1-3 cows or buffaloes which are used both as draft animals and for milk production. 30% of the milk is consumed on the farm, 12% is sold as fluid, and 58% is processed into white cheese, butter, and ghee.

2. Flying herds: These herds account for 7% of the dairy herd and 21% of Egypt's milk production. Most of the operations involve 15-30 high output buffaloes, eatin high quality rations. When the animals begin produci less than 6-8 kg/day, they are slaughtered. The milk produced by these herds is sold as fluid.

3. Commercial farms: These farms account for only 3% of Egypt's dairy herd and 7% of the milk produced. Thes farms usually: are members of the General Cooperative for Animal Wealth; have insurance from the cattle insurance fund, have both imported breeds and local cross-breeds, have their cattle checked by the High Organization for Veterinary services, and receive loa from banks. Modern dairy farms use mechanical systems for milking, cooling, storage, and transportation, bu because buffalo udders are short, it is difficult to milk them by machine.

Diseases and Prevention: It is estimated that 40% of Egypt's he is infected with brucellosis. This disease is one of the cause of low fertility. Other diseases include: lumpy skin disease, foot and mouth disease, cattle plague (rinder pest), and blackl disease.

The government runs a vaccination program that has helped to reduce disease. The vaccines for foot and mouth disease and

Dairy (cont.)

rinder pest are provided free of charge. The vaccine for brucellosis is not free, and is mainly used at commercial dairies, although its use is not recommended.

Method of Feeding: Cattle are fed in confinement.

Feed Used: There are two main types of feed used in Egypt:

- Unified feed (.5 mil tons/yr) = 48% wheat, 20% corn, 10% cottonseed meal, 5% rice bran, 5% rice hulls, 2% rice germ meal, 5% molasses, 3% limestone, 2% salt.

- Free Market Feed (1.8 mil tons/yr) = 33% wheat bran, 15-25% corn, 10% cottonseed meal, 25-50% farm by-products (rice straw, rice hulls, beans, straw, barley straw), 5% molasses, 3% limestone, 2% salt.

Both of these feeds cost 360 LE/ton. The public sector is now producing two kinds of improved compound feed: regular traditional feed (14-16% protein) which sells for 350 LE/ton and high protein feed (22% protein) which sells for 425 LE/ton.

Problems Faced: (see Beef)

1. Demand for milk is greater than supply and urban demand is growing, so prices are high. This is encouraging farmers to think about marketing milk, but the capital costs and costs of inputs are high.

2. With increased mechanization, milk production has increased, but herd improvement techniques must be used before production can increase further.

3. Productivity is limited by lack of forage, feed shortages, low quality feed, high input costs, inefficient management techniques, disease, and high capitalization costs.

4. The hot weather in Egypt decreases fertility and productivity. The age at first calving is high, the intercalving periods are long, and milk yields are reduced. Foreign breed lactation decreases from 300 days/yr to 250

Dairy (cont.)

days/yr when they are brought to Egypt.

Production Parameters

	Buffalo	Local Foreign Breed Cow
Age at first calving (months)	30-42	30-36
Calving interval (months)	15	14-15
Calving rate (percent)	63	49
Mortality rate (percent)		
Calves < one year	20	20
Calves > one year	5	5
Milk yield:		
Per lactation (kgs)	1,200	750

Dairy (cont.)

Slaughter and Marketing

General Information: Most milk consumed in Egypt is processed, as Egyptians do not drink much fluid milk. Buffalo milk is sold both as fluid and as processed dairy products, while cows milk is mainly sold as processed products.

Handling Technique: Two thirds of milk production in Egypt is used on farm. It is processed on farm into cottage cheese (Kareesh), the cream is separated for the local market or for making ghee, and the rest is consumed directly or fed to calves. The other one third is sold in the local market or to the dairy industry.

Of the milk that is marketed. 80% is processed into feta and other cheese, and 20% is for direct consumption.

Problems Faced:

1. Hot weather and lack of refrigeration mean that milk is highly perishable if sold as fluid milk.

2. Inadequate transportation and storage facilities result in large losses.

Livestock: Sheep/Goats

Total Animals in Egypt:
Sheep: Beginning Stock 3,554,000 (2,850,000 Ewes)
Lamb Production 2,392,000

Number of Animals Slaughtered:
Sheep: Ewes 381,000 Total sheep/goats: 3,760,000
Lamb 1,903,000
Other 22,000

Total 2,306,000

Yield: 82,000 tons of lamb, mutton and goat.

Geographic Distribution: Sheep and goats are located all over Egypt; 45% in Upper Egypt, 30% in the Western Desert, and 25% Lower Egypt.

Economic Value: Sheep: 830,160,000 LE

Domestic Consumption: Sheep: 714,310,000 LE

Conversion Ratio: 15 tons feed/1 ton meat

Cost of Feed: approximately 350 LE/ton

Farmgate price: 8 LE/kg liveweight for sheep
(dressed weight = 45-50% liveweight)

Amount Exported: Sheep: 98,000 head @ $35 million
(115,850,000 LE)

Exported To: Saudi Arabia

Breeds Present: Egyptian sheep consist of fatty-tailed, coarse wool breeds: rahmani, ossimi, barki, and saidi. Rahmani and ossimi are located mainly in the Old Valley, barki in the West Desert, and saidi in Upper Egypt. Goat breeds include baladi barki.

Some new breeds of sheep are being introduced. A cross breed Finnish and 3/4 ossimi and another cross breed between Romanof (Russian) and Rahmani have already been tested and are being

Dairy (cont.)

introduced on a limited scale now. Cross breeds with the following breeds of sheep are being tested now: Geos (Cyprus), Awasi (Syria), Suffolk (England), and Marino (Australia).

Animal Production

General Information: Sheep and goats represent the least developed livestock sector in Egypt. Most farmers who raise sheep have less than five feddans of land and fewer than 10 sheep, and these farmers are distributed over a large area.

In Egypt, an intensive breeding system, 3 lambs/2 years, is us There are usually more lambs in the Winter, because berseem is winter crop.

Diseases and Prevention:
Sheep pox is a common disease, and there is a widely available inexpensive vaccine to prevent it.

Mineral supplements in the form of licks are used to prevent mineral deficiency.

Method of Feeding: In the desert, Bedouins raise sheep using t free-range feeding method. In the Delta, sheep feed on the po harvest stubble of wheat and maize and are given supplements a night. Some farmers also feed their animals in confinement.

Feed Used: There is no government subsidized feed for sheep an goats. The feed that is available is low energy, low protein, and high roughage. It usually contains too much limestone (3% and salt (2%) and has no added vitamins or mineral supplements Farmers have started weaning later to ensure that lambs are getting adequate nourishment. Some small ruminants feed on vegetable waste.

On the Northern Coast, rain fed wheat and barley are available for feed, but in some areas, the animals must scavenge for foo Many consume vegetable waste as the main part of their diet.

Problems Faced:
1. There is a lack of adequate feed.
2. The lack of good feed causes farmers to wean lambs later, which reduces the productivity of ewes in terms of lamb production.
3. The wide distribution of farmers makes modern feeding techniques difficult to implement.

Sheep/Goats (cont.)

4. There is a high rate of lamb mortality because there is a shortage of mother's milk.
5. Many sheep suffer from mineral deficiency.

Sheep/Goats (cont.)

Slaughter and Marketing

General Information: Egyptian consumers prefer lamb and mutton t goat meat. Although meat is consumed all year round, the bigges time for lamb consumption is during the feast of Kurban Bairam a the end of the Hajj.

Handling Technique: Some sheep are slaughtered in villages with official butchers or for special occasions. Middle men purchase sheep from smallholders and transport them to larger villages or the cities for sale.

Problems Faced: With the new varieties, sometimes the cross-bred sheep do not have a fatty tail. The reduces the potential for selling these sheep during feasts, as the fatty tail has religious/cultural significance.

Livestock: Poultry

Total Animals in Egypt: 10,000,000 layers
Approximately 170,000 broilers

Number of Animals Slaughtered: 170,000 chickens

Yield: 225,000 tons of meat (170,000 tons = chicken, 141,000 commercial broilers)
2.2 billion eggs, commercial
1.6 billion eggs, rural

Geographic Distribution: Poultry is raised all over Egypt

Economic Value:

Domestic Consumption: Approximately 330,000 tons

Conversion Ratio: 2.2-2.5 kg feed/1 kg meat

Cost to Produce: 2.80 LE/kg (broilers) .15-.17 LE/egg
2/3 of the cost of production is feed, which costs 660-100 LE/ton. One-day old chicks cost 1 LE/ea.

Net Profit: 3.00 LE/kg liveweight .18 LE/egg
18 LE/m^3 cage or floor waste
Dressed weight is 70-80% of liveweight.

Amount Exported: The amount of poultry exported is negligible, as it is necessary to import chicken to meet demand. However, some local variety chicken are exported as breeders.

Exported To: Some Arab countries

Breeds Present:
The main varieties of chickens used in commercial poultry production are: broilers; Abor Acres, Hubbard, Lohman's, Hypro, Enac and layers; Lohman's Eurobred. Other imported varieties include Eza Brown and High 6.

Local breeds raised in rural areas include: Fayoumy and Dandarawi. Other local breed include Silver Montaza, Gold

Sheep/Goats (cont.)

Montaza, and Gameza. White Plymouth Rock and Fayoumy chickens have been cross-bred to produce the "Dokki 4".

Only one day old chicks are imported to form the breeder stock for both layers and broilers. The price range for one day old chicks is $1.90-$4.95/chick. There is one company in Egypt that produces one day old chicks of the Hubbard breed at a rate of 700,000/yr. No hatching eggs are imported.

Animal Production

General Information:

Meat

Village flocks of chickens, ducks, and geese make up about 25% of Egypt's poultry meat, while the other 75% are broilers produced at modern commercial broiler operations, ranging from one-room to very large operations with their own feed mills. There are 17,000 closed broiler houses of concrete and bricks. Typical production is about 5000 birds during a 6-7 week cycle with 4-5 cycles per year, although recently, production has dropped to about three cycles per year because of the lack of affordable feed. Production usually stops for 3-4 months in Summer because of the heat. There are also 10 private sector duck operations producing 20,000 tons/year and 50 private sector turkey operations producing 20,000 tons/year.

Eggs

Village flocks produce about 30% of the eggs in Egypt. While the actual number of eggs produced in villages is increasing, the percentage produced in the village is decreasing. There has been a shift from production of broilers to production of layers recently, because farmers believe that layers are more profitable.

Diseases and Prevention: IBD or gumboro disease is prevalent and contributes to a high mortality rate. There is a vaccine that is available to help prevent the disease.

Other diseases include pleuropneumonia-like organisms (microplasmosis, chronic respiratory disease, and Mareks) and Newcastle disease.

Vaccines for gumboro disease and Marek's disease are imported, so the price is high. Eye drops to prevent Newcastle disease are administered to one-day old chicks and to six-week old chicks. The drops are formulated in Egypt.

Method of Feeding: Most broiler houses do not have bulk receiving equipment and automatic feeders, so feeding is done manually using floor troughs.

Feed Used: A typical poultry feed is: 65% yellow corn, 25% soy

bean meal, and 10% concentrates. Some feed is produced on farm in rural areas. Sometimes vegetable waste or field waste are used.

Problems Faced:

1. The biggest problem in poultry production is poor quality, high-priced feed. Increasing corn prices have forced some producers out of business and others to use lower quality feeds.
2. Disease, such as IBD or gumboro disease, contributes to a high mortality rate of 3-10%.
3. Much of Egypt's poultry is raised using open-rearing, and with this method, weather can sometimes pose a problem.

Slaughter and Marketing

General Information: Poultry producers in Egypt want to produce broilers that are about 1.5 kg live, because they do not want to raise a bird too big for the consumer to buy. Egyptian consumers prefer to buy fresh whole birds. After the seven weeks of raising broilers, two additional weeks are required for marketing and cleaning.

Handling Technique: 65% of the broilers produced in Egypt are sold live because of a lack of slaughter houses and because of the preference for purchasing live birds. Commercial broiler operations sometimes slaughter the birds themselves and sometimes contract with slaughter houses.

Eggs are graded by size but are not inspected. They are sold unwashed. The average consumer in Egypt consumed 50 eggs/year. The consumption is higher in Winter than in Summer. The layer industry used 10,000,000 eggs for hatching, while the broiler industry used 250 million.

Problems Faced:

1. Consumer demand is low because of decreased spending power, and the price of chicken has gone up twice in three years. Consumers are substituting red meat, legumes, eggs, seafood, and dairy products for poultry.
2. Production problems sometimes cause a large difference between live and dressed weight.
3. 20-30 buyers dominate the market for broilers and price can vary substantially. Prices decrease when large shipments of corn arrive and when the production cycles of several large producers begin at the same time.

Livestock: Honey

Total Hives in Egypt: 1,400,000 modern (langethrose) hives
250,000 traditional hives

Yield: 15 kg/modern hive/year and 2-3 kg/traditional hive/year

21,000 tons of honey/year from modern hives and 500-750 tons/year from traditional hives.

Also, it is estimated that through pollination, bees can increase crop production up to 50%.

Geographic Distribution: Beehives are located throughout Egypt.

Economic Value: 168,000,000 LE

Domestic Consumption: 160,387,000 LE

Cost to Produce: 1 LE/kg Farmgate Price: 8 LE/kg

Amount Exported: Egypt exports about 200 tons of honey, 15,000 swarms and some queens. The total value of these exports is $2.3 million.

Exported To: Saudi Arabia, Oman, Yemen, and other Arab countries.

Season: In the Eastern region, honey is produced only during the citrus season (April), but in the Western regions, honey is produced from citrus, clover (May-June) and cotton (July-August) crops.

Breeds Present: In modern apiaries, the most common breeds are Carnica, found mainly in New Valley, and Italian, found mainly in El Manzala. There are currently attempts to produce a varoa-resistant strain of bee using artificial insemination.

In traditional hives, the variety, most often raised is Lamarki.

Honey (cont.)

Animal Production

General Information: Most honey is produced by small producers, although there are about 50 colonies that have 5000 hives.

While it is easier to get the honey out of langethrose hives, some traditional hives are necessary, as they provide the wax that is used in the modern hives.

Diseases and Prevention:
A parasite called varoa affects both immature and adult bees and has a negative effect on honey production. Bees can also suffer from dysentery and paralysis.

Antibiotics are given to bees in a mixture of sugar syrup in the Winter months when they are not producing honey. Beekeepers use natural methods to protect bees from disease when they can. These methods include: lactic acid, oxalic acid, and essential oils like camphor, eucalyptus, and worm seed. If the natural cures are ineffective or the parasite population is very high, chemical treatments are used. Chemicals include: Abistan, Abitol, and Bivrol (all from Ceiba-Geigy, USA). If chemicals are used, they are used only in non-honey producing seasons, to prevent contamination of the honey.

Feed Used: During the honey producing seasons, there is no need to feed the bees, but in the Winter, they are fed on sugar syrup with some disease control ingredients added. During honey-producing seasons, the bees feed from the main crops: clover, citrus, and cotton. In Upper Egypt, bees also consume sesame and sunflowers during July and August.

Problems Faced:
1. Varoa is a serious problem for beekeepers.
2. Bees have several important natural predators, among them are: wasps and a bird called "bee eater" or "mirobes".
3. Insecticides used by neighboring farmers can affect the bee population. This problem has been especially serious in traditional hives.

Marketing

General Information: Honey is graded according to the crop fr which it was produced. Consumers prefer honey from the citru crops. Honey from the clover crop is second best and the low grade is cotton.

Handling Technique: Honey is extracted from traditional hives hand (squeezing), but an extractor is used to remove honey fr the langethrose hives. The extractor uses centrifugal force extract honey from the combs. Once extracted, the honey is passed through two sieves and is stored in a tank for 5-15 da Then it is bottled and ready for marketing.

Problems Faced: Honey producers do not face many post harvest handling problems. One marketing problem, however, is that m consumers are afraid that the honey contains too many chemica both from the plants that the bees get pollen from and from w is used in raising the bees themselves.

Program Name: Farmlink **Program Sponsor:** CARE

Type of Assistance: Provide technical and marketing information and aid in problem solving

Geographic Target Area: Fayoum and Sohag currently; Aswan and Qena to be added in 1992; possibly other areas in the future.

Program Description (methodology): A multi-disciplinary team of Agricultural Extension Officers (AEOs) is present in each participating governorate. AEOs aid the farmers in identifying problems they would like to solve through Participatory Rapid Appraisal (PRA). PRA includes holding meetings with innovative farmers, conducting informal interviews, determining farmers' preferences, developing diagrams and maps, and discussing new innovations in farming techniques. After a problem is identified, the farmer is offered choices for addressing the problem. AEOs offer choices through giving "sample kits" of seed and fertilizers, giving demonstrations, organizing small agricultural fairs, encouraging commercial suppliers to visit innovator farmers to give demonstrations, arranging inter-village farmer-to-farmer communication, and encouraging nurseries to offer a wide range of germplasm. Farmers are then encouraged to conduct small-scale experiments with he cultivation practices, genetic material, or other materials they have selected. AEOs provide information on experimentation techniques. The project does not offer materials, equipment or credit, but will assist in linking the farmer with existing suppliers and sources of credit.

Eligibility: Farmers are selected by CARE from those who cultivate less that five feddans and who grow horticultural crops. The selection process is made through holding village meetings and conducting personal interviews.

How to Apply: N/A

Contact: James Fennel, Project Manager

Address: CARE, 18 Hoda Sharawi St., Cairo, P.O. Box 2019

Telephone: 3932756/3935262

Fruits Introduction (cont.)

Program Name: Animal Production Technology
Program Sponsor: CEMARP (Canada-Egypt McGill Agricultural Response Program)

Type of Assistance: Training and extension services in the areas of embryo transfer, artificial insemination and animal health.

Geographic Target Area: Kafr El Sheikh

Program Description (methodology): The project provides training for the improvement of cattle breeds at the International Livestock Management Training Center. Both professional and technical personnel involved in cattle breeding are may attend. Extension is provided through a series of interventions in the areas of animal health, embryo transfer, artificial insemination production of vaccine and serum, and research in disease control

CEMARP has provided assistance to the Animal Production Research Institute in the areas of embryo transfer and artificial insemination for use in cattle breeding to improve the productivity of local stock. The breeding unit has developed the capacity for producing 500,000 straws of frozen semen and 400 embryos per year as well as housing about 100 bulls. The breeding unit is also fulfilling a role as a training center. The basic purpose is to transfer technology and demonstrate its application to the conditions of small herds.

Eligibility: Any farmer who owns 50 head of cattle or more is eligible to apply for courses free of charge.

How to Apply:

Contact: Dr. Hussein El Nouby, Director

Address: Animal Production Research Institute
Nadi El Seed Street, Dokki

Telephone: 702934

Program Name: Food Sector Development Project - Dairy component
Program Sponsor: EEC

Type of Assistance: Credit line for milk producers, traders and processors

Geographic Target Area: Sembellauin in Mansoura, Faraskour in Damietta, Qutur in Gharbia, Shanshour in Minufiya, and Qullin in Kafr El Sheikh

Program Description (methodology): The project provides an integrated program of technical assistance and makes credit to buy the needed inputs and machinery available to producers, traders, and processors. The program includes technical assistance in feed supply, artificial insemination, milk collecting and processing, and veterinary care.

Experts from the EEC and extension people from the MOA travel in vehicles provided by the National Milk Cooperative to provide project participants with information and supplies. The credit line is through Commercial International Bank, but as it does not have branches in all areas, PBDAC and others are participating as needed.

Eligibility: Any producer of milk is eligible to participate in the program, but it is especially geared toward participation by those farmers who own five to ten head. After the first year, the project will begin working with farmers that have fifty head or more.

How to Apply: Interested farmers should request an application at their nearest milk cooperative office. For Further information:

Contact: Dr. Hussein El Nouby, Director

Address: Animal Production Research Institute
Nadi El Seed Street, Dokki

Telephone: 702934
Cairo Project Managers:
Ismail Gomea, Shanshour 3498931
Helmy Yakout, Faraskour and Sembellauin 3498931
Abdel Aziz Farreg, Qutur and Qullin 704820
Field Managers:
Mokhtar Attalla in Faraskour ((057) 322078

Fruits Introduction (cont.)

Mohamed Issa Emara in Qullin (040) 750919
Samy Setouki Khalifa in Sembellauin (050)346995
Abdou Afya in Shansour (048) 342071
The project manager for Qutur has not been chosen yet.

Program Name: Animal Feed Quality Improvement Project
Program Sponsor: EEC through APRI

Type of Assistance: Provision of information and supplies for enriching animal feed

Geographic Target Area: Nile Delta Region

Program Description (methodology): The project developed the technology for treating straw and crop residue with ammonia to increase the feed value. The straw is then supplemented with molasses.

Information about the technique is being disseminated through the Ministry of Agriculture Extension service. Molasses can be purchased from the local agricultural cooperatives, and ammonia is available through the Animal Production Research Institute (APRI). There are eight APRI centers in the Delta that have Centers for Ammonia Feed Distribution.

Eligibility: Any one is eligible.

How to Apply: Farmers should contact the APRI center nearest them, or ask their cooperative representative where the nearest center is.

Contact: Dr. Hussein El Nouby

Address: Animal Production Research Institute
Nadi El Seed Street, Dokki

Telephone: 702934

Fruits Introduction (cont.)

Program Name: International Center for Training in the New Lands
Program Sponsor: UNDP

Type of Assistance: Training and extension in the following areas: farm establishment, irrigation policies and management, crop production and windbreaks, small livestock practices, agricultural mechanization, marketing and cooperatives, agricultural economics and extension training.

Geographic Target Area: Noubariya

Program Description (methodology): The program has three types of training for farmers. The first is pre-settlement training for university graduates who have just received their land grants. This training consists of 4-8 week courses covering the basics in cultivation, irrigation, administration and legal aspects of farming. The second type of training is for settled beneficiaries of the land grant system. For those settled farmers who graduated from a faculty of agriculture there will be training so that they can become volunteer extension agents (VEAs). Seminars, field days, women development agents and vocational and handicrafts training will also be available for settled farmers in the area. The third type of training is technical training in specific fields such as: irrigation system design and operation, fertilization and plant rotation, cereals and forage production, vegetable production, fruit production, livestock, poultry, pest control, agricultural mechanization, marketing and storage.

In addition to the training available for farmers, specialists will be trained to provide backstopping for VEAs, agricultural engineers will be trained to play a role in extension along with their administrative duties, and cooperative boards will be trained in methods to increase efficiency.

Eligibility: All farmers in Noubariya

How to Apply: For more information:

Contact: Ibrahim Aly

Address: International Center for Training and Development
34 Desert Road, Alex-Cairo, Maamoura

Telephone: (03) 980056

Fruits Introduction (cont.)

Program Name: Protected Agriculture Project
Program Sponsor: UNDP, USAID, MALR

Type of Assistance: Research to solve problems identified by farmers, training in all aspects of protected agriculture, and extension.

Geographic Target Area: Participants are from all over Egypt. Accommodations are provided on site at the training center.

Program Description (methodology): The research component of the project consists of applied research. Surveys are conducted to determine what problems farmers are facing. Then researchers conduct experiments to determine the best way of solving the problems.

The training component is divided into long-term and short-term training. The long-term training is for growers of any background. They work for one whole season in protected agriculture with a variety of crops, and for two hours of each day attend lectures. The participants spend two weeks with each crop, and the courses run from August through June. The short-term training is for people with a background in agriculture. The courses last from 30-40 days and cover the advances in protected agriculture. The long-term classes are for beginners and the short-term classes cover more advanced material.

Extension is provided through technical pamphlets that are distributed to those who come to the project's demonstration sites. Transplants are available for sale at demonstration sites, and visitors are encouraged to see the new techniques being used. Sites are located as follows: one in Bossaily in Rosetta, one each in Tukh and Saha in Kafr El Sheikh, one near the pyramids, one on the gold island in the Nile, and one in Noubariya. There is a research site at the Arid Lands Laboratory at Ain Shams University. Experts make site visits as requested. Also, the Expert System Project for Improved Crop Production, is affiliated with the Protected Agriculture Program. This program consists of using a data base to better diagnose some plant diseases and pests. There will be a pilot program in 1993, when each governorate will receive a computer and will use it for use by the extension service.

Eligibility: Anyone can visit the demonstration sites, but it is more difficult to be accepted to the courses. For the training applicants who have land, especially if they were awarded land

the ministry as part of the new graduates program are given top priority. Next are those who have a contract to work in protected agriculture with a private or public firm. Third are those who have no access to land right now, but are definitely interested in attempting to work in protected agriculture. All candidates must be able to read and write, and should have at least some experience with agriculture.

How to Apply: A committee of experts selects the best of the applications, and then holds interviews, which are very much like oral examinations.

Contact: Mr. Amin Omar, Training Specialist

Address: Machail Bakhun Street, Dokki

Telephone: 3490053

Fruits Introduction (cont.)

Program Name: Small Farmer Machine Training
Program Sponsor: MOA - Agricultural Engineering Research Institute and the Depar :t of Technology Transfer

Type of Assistance: Training for small farmers in the use of fa machinery and technical extension as a compliment to the Small Farm Mechanization Project

Geographic Target Area: Mansheya, Sharkiya Governorate

Program Description (methodology): 1000 feddans have been set aside for practical training in using, maintaining, and repairi machines. The purpose of the project is to let farmers learn about and try different types of machinery before they make the decision to buy, thus encouraging mechanization and crop production.

Eligibility: Any farmer may attend. Usually the participants a limited to those from Sharqiya governorate. Transportation cos are paid by the training center.

How to Apply: Candidates should apply by contacting the coordinator at the Agricultural cooperative in Mansheya. For more information:

Contact: Engineer Yasser Ali

Address: Agricultural Engineering Research Institute
Nadi El Seed St., Dokki - Cairo

Telephone: 3487212/705953

Program Name: Agricultural Cooperative Services in Fayoum
Program Sponsor: GTZ

Type of Assistance: Advisory and training services to agricultural cooperatives, as well as financial support for developing cooperative service projects

Geographic Target Area: The Governorate in Fayoum

Program Description (methodology): This project represents a shift to non-centralized levels of Technical Cooperation, emphasizing relationships with the private sector and local levels of authority. The Egyptian partner in this effort is the umbrella cooperative organization of Fayoum Governorate, the Central Agricultural Multi purpose Cooperative Society of Fayoum (CAMSC).

In Fayoum, a total of some 145,000 farmers, 20 percent of whom are women, are members of cooperatives on various levels--from the governorate to the district to the village. Local coops average 870 members each, and in all, there are over 200 cooperatives societies, ranging from multipurpose and specialized activities such as animal husbandry, vegetable production, and poultry production to mechanization and marketing societies.

Since basic government policy is to gradually return sales of agricultural production inputs and outputs to the private sector and to remove the cooperative movement from the government agricultural banking and credit system (PBDAC), the project offers training and advisory services; important measures in helping revitalize the Fayoum cooperative movement, especially at the local level.

By 1990 some local coops were already involved in fertilizer, pesticide and seed sales, while about half of them were taking an active part in crop marketing -- mainly in cotton and grain sales. The ten-year project focusses on information services for the farmer himself, as well as on training and planning for co-financing of various small projects. The training programs include account data-processing and management activities for the 164 local cooperatives, in which membership of all land-owners is compulsory. Training in general, for the approximately 1000-member cooperative staff throughout the governorate, from managers to clerks to cashiers, is taking place at all levels. In addition, technical service projects, such as excavation, clearing canals, seedling production, input storage, and machinery use and maintenance are now being implemented.

Fruits Introduction (cont.)

Eligibility: Cooperative staff members in Fayoum

How to Apply: For more information:

Contact: Samir Morshid

Address: Karnak Building, 1 Mohy El Dine Abou El Ez St., Lotfalla - Fayoum

Telephone: (084) 320426

Fruits Introduction (cont.)

Program Name: Non-Traditional Fodder
Program Sponsor: GTZ

Type of Assistance:

Geographic Target Area: Three villages in three governorates: Mallawy in Minya - Gameza in Tanta, Gharbia, and Geziret El Shaeer in Qalubiya.

Program Description (methodology): The main objective of this project, initiated in 1987 with the Agricultural Research Center (ARC) in Cairo, is to integrate the by-products of crops into animal feed at the farm level, by means of both research and extension programs that go directly to the farmers. The most important by-products of yields are various kinds of straw related to wheat, rice and maize harvests, and those of sugar production from beet-tops, cane-tops, and molasses.

These by-products can be mixed in several ways with common feed-stuffs, by ensiling them, or by improving them with urea treatment or by mechanical means. This fodder is intended for use in feeding ruminants on farms, particularly cattle and buffalo.

Extension packages have been developed on the experimental stations of the Animal Production Research Institute(APRI) and have been tested on a number of representative farms. After demonstrating positive results, these programs are now being implemented in three pilot areas and stations in the governorates of Qalubiya, Gharbia and Minya.

In order to reach a substantial number of farmers, the project is training the agricultural extension staff of the Ministry of Agriculture on all levels - from the Central Government down through the governorates to the districts and villages, on technical aspects of by-product use as well as on extension methodology.

Plans are to decentralize the project and establish training units in each of the three governorates involved, in order to develop a closer working relationship with the farmers and the extension services.

Eligibility: Any farmer can apply to attend seminars, visit the pilot projects and receive extension material.

How to Apply: For more information:

Contact: Dr. Ismail Gomaa

Address: Animal Production Institute, Nady El Seed St., Dokki

Telephone: 3498931

Fruits Introduction (cont.)

Program Name: Agricultural Mechanization Center, Egyptian Italian Project
Program Sponsor: Italian Government

Type of Assistance: Rental of agricultural machinery and equipment and training.

Geographic Target Area: Alexandria-Cairo Desert Road.

Program Description (methodology): The objective of the project is to provide specialized services in agricultural mechanizatio for graduates, technicians, cooperatives, private companies and companies associated with the Holding Company for Agricultural Development. The center provides information and training on t use of tractors from 55-100 H for special operations, depth bel 90 cm and deep ploughing, as well as leveling with laser beams. The Center uses modern bulldozers for reclamation purposes. Training is provided in operations and maintenance for workers, and educational programs for non-workers.

The following equipment is available at the center: agricultura tractors with various levels of horsepower; Mobile combine harvesting equipment for various crops; modern equipment for ploughing, weeding, mechanical seeding with planters, fertilize application (organic and chemical), opening canals, drainage construction, and other equipment. The center also has a computer division that can be used for planning, administration and operation of spare parts storage.

Eligibility: Graduates, technicians, cooperative employees, and private companies in the area.

How to Apply:

Contact: AMC

Address: 48 km Alexandria - Cairo Desert Road.

Telephone: 980125/981218
Fax: 981217

Fruits Introduction (cont.)

Program Name: Community Development services (CDS)
Program Sponsor: NEF (Near East Foundation)

Type of Assistance: Courses and seminars on Desert agriculture, marketing, and business.

Geographic Target Area: South Tahrir

Program Description (methodology): Technical training for desert farm management on-the-job-training is provided for six weeks at South Tahrir. The project also includes agro-business workshops which include: feasibility studies, agricultural business and marketing.

Eligibility:

How to Apply: Mr. Ihab Zaghloul

Contact: CDS, 4, Ahmed Pasha St. Garden City

Address: 3546599

Telephone:

Program Name: Strawberry improvement Center
Program Sponsor: Ain Shams University (formerly supported by FAO)

Type of Assistance: Complete technical support and extension services for strawberry growers and production of strawberry seedlings

Geographic Target Area: Ismailiya and Qalubiya

Program Description (methodology): The center provides weekly consulting services though the Strawberry Improvement Center at Ain Shams University, the Pest Control Institute, The Plant Production Institute, and the General Administration for Horticultural Products. The services are provided free of charge. The center also exported 20 million strawberry seedling to Europe in 1991.

Eligibility: Any farmer in Ismailiya and Qalubiya who is interested in growing strawberries.

How to Apply:

Contact: Dr. Amin Okasha

Address: Horticulture Research Institute

Telephone: 720617

Program Name: Integrated Pest Management
Program Sponsor: GTZ

Type of Assistance: Extension

Geographic Target Area: Ismailiya and Beni Suef

Program Description (methodology): The project, which began in July 1992, provides extension services to enable Egyptian farmers to carry out pest management on their own with support from the extension service.

Problems related to pests have led to losses in nearly all crops. the reasons for this parasitic attack of disease and plant pest are: improved condition in general for pests (2-3 crop rotations throughout the year due to continuous irrigation); inappropriate and wrong application of pest management measures such as wrong timing, overdoses and inappropriate use of pesticides, herbicides, and fungicides; and sometimes complete absence of plant protection measures due to insufficient availability of suitable plant protection products.

Eligibility: The criteria for eligibility have not yet been determined.

How to Apply: For more information:

Contact: Dr. Kaskae, GTZ Project Manager or Dr. Nabil Soliman, Egyptian Project Manager

Address: Central Agency for Pest Control
Nadi El Seed Street, Dokki

Telephone: 703860/719415

Program Name: Improvement of Artichoke
Program Sponsor: FAO

Type of Assistance: Extension and research

Geographic Target Area: Scuth Tahrir, Noubariya, Ismailiya

Program Description (methodology): The program has not been implemented yet, but it is planned to improve the quality and increase production and post-harvest handling (packaging, cooling, preparation for export) of artichokes. The improveme will be realized in two steps: first through research to devel tissue culture for the most appropriate variety of artichoke f the conditions in Egypt, and second through extension and training that takes place at research stations and through on farm demonstrations.

Eligibility: The farmers will be chosen by the project, but ex criteria have not been set yet.

How to Apply:

Contact: Dr. Amin Okasha

Address: Horticultural Research Institute

Telephone: 720617

Program Name: Agricultural Mechanization Project
Program Sponsor: MOA Agricultural Engineering Research Institute (formerly supported by USAID)

Type of Assistance: The project provides rental machinery complete with operator and mechanic at competitive rates.

Geographic Target Area: Three rental stations are located in each of the following governorates: Kom Ombo, Minya, Beni Suef, and Assiout, in Upper Egypt, and Dakahliya, Beheira, Gharbia, and Sharqiya in the Delta.

Program Description (methodology): The program began providing the use of machinery free of charge, but with the necessity of becoming self-sufficient, has begun charging a competitive fee for the service. While the project has become much like a private sector rental operation in terms of fees, it does provide more information on machine usage and other extension services if needed. This information is not usually available through private sector rentals.

Centers are located at the Agricultural Cooperative in each of the above areas. Transportation within five kilometers of each center is free, and costs 65 p. for each kilometer after that.

Eligibility: Anyone with five feddans or more can rent a machine. The five feddans can consist of two or more neighboring plots where the farmers are combining the land and dividing the cost for the purpose of renting the machines.

How to Apply: Interested farmers should contact the cooperative in their area to determine the closest rental station. For more information:

Contact: Eng. Essam Wasef, Director of Technology Transfer Department

Address: Agricultural Engineering Research Institute
Nadi El Seed Street, Dokki - Cairo

Telephone: 3487212/705953

Program Name: Animal Husbandry Credit Project
Program Sponsor: Catholic Relief Services

Type of Assistance: Small loans for farmers who want to purchas animals to engage in animal husbandry, and training both for th local project holders and for those who receive loans.

Geographic Target Area: Upper Egypt. Four villages in each of the following governorates: Sohag, Assiout, Minya, Fayoum. The villages have not been determined yet, as the project is scheduled to begin in January 1993.

Program Description (methodology): There are two parts to the project. First: Loans of up to 900 LE will be given at 10% interest. The payback period is six months for a calf, 18 mont for a lamb, and 24 months for a buffalo. Second: Training will be given to the local loan managers, who will be given grants from which to make the loans. Training will also be given as needed to farmers who participate in the loan program.

Eligibility: Candidates must have 1.5 feddans or less in order qualify. They also must live in the villages where th project holders are located.

How to Apply: Candidates should contact the project holder in their village. These people have not been selected yet, but th Agricultural Cooperative will know how to reach the project in each area.
For more information:

Contact: Mohamed El Hadi Hashem, Senior Project Officer

Address: P.O. Box 2410
13, Ibrahim Naguib Street, Garden City, Cai

Telephone: 3541360/352404/3558034

Program Name: Sheepbreeding Project
Program Sponsor: Embassy of Finland

Type of Assistance: Research on, extension for, and distribution of cross-bred 1/4 Finnish 3/4 Ossimi sheep.

Geographic Target Area: Currently, there are some pilot farms in the New Lands areas near Ismailiya, but soon there will be nucleus farms for breeding half-breed animals throughout Egypt.

Program Description (methodology): The sheepbreeding project has three components. The research component was to determine the appropriate mix of Finnish and Egyptian local variety sheep to increase productivity at the lowest cost. It has been determined that 1/4 Finnish-3/4 Ossimi meets these criteria. Currently, follow-up research is being carried out on selected pilot farms. Stage two will involve setting up nucleus farms where half breeds will be produced so that 1/4 finnish sheep can be distributed to farmers for a fee. When a sheep is purchased, the farmer will receive information about the cross-bred sheep, and can call the project to receive extension services.

Eligibility: Pilot farmers are chosen by the project.

How to Apply: For more information:

Contact: Essam Shahata

Address: Animal Production Research Institute
Nadi El Seed Street, Dokki

Telephone: 703283

Program Name: Greenhouse Project for Young Graduates
Program Sponsor: Government of France

Type of Assistance: Credit to buy fully equipped greenhouses

Geographic Target Area: Noubariya

Program Description (methodology): Credit is provided at a low interest rate and with a liberal grace period for new graduates with small farms in Noubariya. The credit line allows farmers purchase fully equipped greenhouses for the production of vegetables or other horticultural crops.

Eligibility: Graduates who own less than five feddans or less a who are residents of Noubariya are eligible.

How to Apply:

Contact:	Eng. Ahmed Ismail, Director of the Young Graduates Organization
Address:	Noubariya
Telephone:	(03) 981661

Program Name: Beekeeping Project
Program Sponsor: Catholic Relief Services

Type of Assistance: Credit and technical assistance

Geographic Target Area: Minya and Assiout

Program Description (methodology): Loans of 500-600 LE are provided for beekeepers who would like to purchase modern, langethrose hives. The loan amount is enough for the farmer to purchase ten hives.

Eligibility: Any small farmer in Minya

How to Apply: Interested farmers should contact the Beekeepers Cooperative in Minya or the ORDEV office in Manfalout

Contact: Sayed Tawfiq, Executive Manager

Address: Agricultural Cooperative for Beekeepers, Minya

Telephone: (086)320191

or Abbas Mobarak
ORDEV, Manfalout
328808

Program Name: Honey Marketing
Program Sponsor: Catholic Relief Services

Type of Assistance: Technical assistance and training

Geographic Target Area: Minya

Program Description (methodology): The project provides technic: assistance and training in marketing to members of the Agricultural Cooperative for Beekeepers. Assistance covers market research, packaging, and distribution.

Eligibility: Cooperative members (any producer can join the cooperative)

How to Apply:

Contact: Sayed Tawfiq, Executive Manager

Address: Agricultural Cooperative for Beekeepers, Minya

Telephone: (086) 320191

Program Name: Technical Assistance to the National Potato Project
Program Sponsor: The Netherlands

Type of Assistance: Research, training and equipment

Geographic Target Area: Gharbia, Beheira, Minufiya governorates with Tanta as the center.

Program Description (methodology): In conjunction with the Vegetable Research Institute in Dokki, the project sponsors research on potato varieties, agronomy and physiology, mechanization, storage, diseases, and seed production. Local training is provided for tractor drivers and technicians, and field days ore offered for growers. Training in The Netherlands is available for a few researchers, mechanization specialists, and seed inspectors. Consultants from The Netherlands come to Egypt at regular intervals to address problems with the Potato Growers Cooperative.

While there is potential for the results of this type of project to never reach the farmers, because the Potato Growers Cooperative is very strong, most potato growers in the area are able to get involved in the field days and some of the training. In addition research results are disseminated quickly among cooperative members. Potato growers can go to the project to buy seed potatoes of the newly tested varieties and receive information about planting and optimal growing conditions.

Eligibility: Any potato grower in the area can participate in field days and purchase seed potatoes. The people who participate in the training are chosen by the project.

How to Apply: For Local training, farmers should contact the Potato Growers Cooperative. Applications for training abroad should be submitted to the Netherlands Embassy. For more information:

Contact: Tarek Mourad

Address: Embassy of The Netherlands
18, Hassan Sabri, Zamalak

Telephone: 3406872/3406434

Fruits Introduction (cont.)

Program Name: National Cattleman's Bank
Program Sponsor: U.S. Agricultural Office

Type of Assistance: The program is being established to take the place of the National Buffalo Program. Credit and inputs are provided.

Geographic Target Area: All over Egypt

Program Description (methodology): The project will provide low-cost inputs for farmers who which to participate in calf fattening. Loans will be provided for the purchases cf inputs or calves. The project will also purchase the calves after fattening.

The project is not yet in place, so it is uncertain how much of the infrastructure from the National Buffalo Program will be used.

Eligibility: Any cattle farmer is eligible.

How to Apply: Farmers should contact their cooperative to find out when the project will begin in their area. For more information:

Contact: Ron Verdonk

Address: Office the U.S. Agricultural Attache
U.S. Embassy
8, Kamal El Din Salah Street, Garden City

Telephone: 3557371 Ext.2388

Program Name: EEC Agricultural Credit Line
Program Sponsor: EEC

Type of Assistance: Credit

Geographic Target Area: All governorates.

Program Description (methodology): The EEC Agricultural Credit Line is designed to provide loans and import financing for the purchase of machinery, equipment and inputs from countries in Europe who are members of the European Economic Community (EEC) and for which there are indicators for product need. The EEC provides a grant to the PBDAC so that the bank may set up a credit line for farmers.

Eligibility:
- Farmers (small to medium sized) wishing to increase productivity by access to imported technology.

- Authorized dealers and agents engaged in the import of agricultural equipment and inputs.

- Companies engaged in agricultural, agro-industrial and agro-business developments.

How to Apply: Farmers should apply at their local PBDAC, or as for information at their cooperative.

Contact: Dr. F. Heinemeyer, Project Manager EEC or M. Gharib

Address: PBDAC 110 Kasr El Eini St., Garden City

Telephone:

Program Name: Credit Line
Program Sponsor: World Bank with the cooperation of the African Development bank and the African Fund

Type of Assistance: Agricultural Credit

Geographic Target Area: Only available in seven governorates: Beheira - Gharbia - Kafr El Sheikh - Damietta - Dakahliya - Sharkiya - Fayoum.

Program Description (methodology): This program provides $102 million for agents who are licensed to import the following:
- Agricultural machinery and equipment.
- Spare parts and tools.
- Packaging and cooling equipment.
- Equipment used for repair and maintenance.
- Machinery for agri-business operations.

The program offers short term loans (less than one year) for 65% of the total CIF value of imported machinery; and offers long-term loans (4 years with 1 year grace period) for 65% of the CIF value.

The program also provides credit to farmers in the seven governorates listed above with loans to be repaid within 5 years. The value of the loans is up to 80% of:
- The value of agricultural machinery purchased by farmers through this program and in the target area.
- The cost of establishing a maintenance and repair workshop including the cost of agricultural equipment and machinery.

Eligibility: Eligibility is decided by PBDAC upon application.

How to Apply: Applicants should contact the PBDAC office in one of the seven areas above.

Contact: World Bank Loan Office

Address: PBDAC, 7th Floor
110 Kasr El Eini Street, Garden City

Telephone:

Program Name: Small Farms Mechanization
Program Sponsor: GTZ

Type of Assistance: Extension - Field Days - Orientation Meeting:

Geographic Target Area: The field station of the project is located at El-Mansheya, Belbeis - Sharkiya

Program Description (methodology): The overall goal of the project is to introduce appropriate mechanization technologies and make them available to small farms. To reach this goal, the project aims are: identifying appropriate technologies and testing them for acceptability; advising local manufacturers and dealers on making appropriate machinery available; familiarizing extension agents and training institutes with recommended technologies; and advising custom-hiring operators and owners of machinery on economic application and management.

To assure farmer acceptance of the demonstrated, modified, and locally manufactured machines, a hiring system, based on economically efficient criteria, is being used to rent machines at profitable prices during normal crop production. Special emphasis is placed on demonstrations and other extension activities, which are offered to all interested target groups.

Extension activities are carried out by holding field days and orientation meetings, using extension workers on site, and also sending them to training institutions for specific mechanized operations.

In addition, extension packages for mechanized crop production are prepared, including both technical and economical issues, an information to all interested groups is provided in order to enhance management in the field of mechanization.

Eligibility: All farmers in any Governorate

How to Apply:

Contact: Dr. Mohamed Awad

Address: Agricultural Mechanization Research Institute, Nady El Seed St., Dokki

Telephone: 3604768

Program Name: Farm Machinery Training Center
Program Sponsor: The General Department for Training, Agrarian Reform Organization, The Agricultural Engineering Research Institute, and GTZ

Type of Assistance: Training

Geographic Target Area: Training Center locations are: Maamoura, Alexandria (training for all crops), and Mit El Diba, Kafr El Sheikh (mainly for rice). The centers receive students from all over Egypt as well as from the Sudan and other Arab countries.

Program Description (methodology): The program aims to create qualified personnel in operation, maintenance, and repair of agricultural machinery and technical extension. The course curricula are based on student needs as determined through initial interviews. The center provides long-term (8-15 weeks) basic and advanced courses and short-term (1-4 weeks) special topic courses. The student/teacher ratio ranges from 8 to 15., The center will also design a special course if an organization has 10-12 people that will attend. Courses are updated annually.

The center in Maamoura now has 12 training sections, one workshop, four classrooms, a demonstration plot and four dormitory facilities. A nearby farm of 75 hectares is used for practical activities under production conditions. Up to 150 trainees can be accommodated and trained per day. Over 1000 people are now learning how to operate and service agricultural machinery at the center. "Learning by doing" is the motto, and since 1981, theoretical courses have been replaced by practice-oriented classes and "hands on" programs.

Eligibility: The participants are operators of tractors and other agricultural machinery, irrigation and portable water pump specialists, mechanics from repair shops, agricultural engineers who are technical extension advisors for plant protection, and worker, managers, and trainers in cooperatives.

Although anyone can attend courses at the FMTC, participants mainly include employees of the ARO (General Department of Training), the MOA, and public and private firms involved in mechanized farming.

Tuition is required so that the technical functioning of he Training Center can be financially self-supporting.

Fruits Introduction (cont.)

How to Apply: A candidate should be nominated by his employer, institution, or organization and the nomination should be forwarded to:

Contact: The General Department for Training

Address: Agrarian Reform Organization/ARO
Dokki - Cairo

Telephone: 702715

Or: Farm Machinery Training Center (FMTC)
Maamoura, Alexandria
(03)5471239/5471048

For further information:

Engineer Yasser Ali
Agricultural Engineering Research Institute
Nadi El Seed Street, Dokki - Cairo

Or: Mr. Franke
(03)5471239

Projects for which Information was Unavailable:

Agricultural Credit-

This is a GTZ project in Ismailiya for farm machinery credit.

Agricultural Development-

This project is sponsored by IFAD in Fayoum. Contact in Fayoum: Abdel Latif Hady. In Cairo: Saad Nassar

Asparagus Project -

The project was sponsored by FAO for three years but is now with MOA. The Project Manager is Amin Okasha, Horticultural Research Institute.

Avocado Project -

The project was sponsored by FAO for three years but is now with MOA. The Project Manager is Zeinab Hamba, Horticultural Research Institute.

Dairy Project-

A project by the French Government and NRC for the improvement of dairy products production.

Development of Northwest Coastal Zone and Siwa Oasis-

This is a project sponsored by the UNDP. Contact Mr. Mohamed Allam (03) 934172

Development and Settlement in the New Lands-

African Development Bank and ILO are sponsoring an integrated project.

Oil Crops Project-

The project consists of technical and financial support. Contact: Abdel Aziz Unis Hagazi.

Rural Development-

This is an African Development Bank project working in Beheira and Damanhur. Dr. Sherif Bindari, National Director of Rural

Development Projects is the contact.

Storage Project-

This is a project sponsored by the World Bank. Mohamed Salhy i
the contact person.

Training & Extension-

This project is sponsored by GTZ in Ismailiya.

Training and Extension Center-

The center is located in Ameliya, Bustan and sponsored by JIC
who provides facilities, seeds, and follow-up.

Fruits Introduction (cont.)

Projects that have not yet begun:

Cold Storage Project-

TDC will invest in existing farmers with some storage resources in Ismailiya, South Tahrir, and Noubariya. These farmers will then provide storage services for those around them.

Exporters Union-

Through the Trade Development Center, technical assistance would be provided from start to finish for vegetable and fruit exporters. Loans and grants will be provided and one representative will be working in Europe to facilitate shipments. The idea is being debated in the Assembly.

Honey Production-

The product includes training for honey producers among the North Sinai Bedouin. Contact Mohamed El Biltagi, NARP

Tomato Sauce Production:

Production will be carried out through Gianaclis. Contact: Abdalla Shafei, Foreign Relations Ministry of Agriculture

Training for Handling and Packaging of Fruits and Vegetables:

Contact Dr. Anwar Abd, The General Organization for Land Reclamation

Related Projects:

Agricultural Research Station-

The Finnish government is providing training at three different agricultural research centers. Three equicenters are established and subject matter specialists are available for: pesticides, salinity, and water management.

Agricultural Secondary Schools-

The British Council sponsors schools in Ismailiya and Damanhur. The Council provides stat training in the United Kingdom and British staff and consultants as well as some school equipment.

Brucellosis Project-

The project is funded by the US PL480 Program. Dr. Ali Moussa, General Organization for Veterinary Services

ENSTINET-

Egyptian National Science and Technology Information Network.

Expert Systems-

The project began as part of the UNDP Protected cultivation project. Now it has become a useful computer network that can help in diagnosing plant diseases. Pilot governorates are now being chosen to receive one computer with the new program, so that it can be tested with farmers.

Horticultural Development-

This is a broad program funded by the Netherlands. Includes th following components: crop diversification, shade houses for seedlings, pesticides, extension, marketing, information system women in development, and training.

Water conservation-

JETRO sponsors a project that uses absorbent materials under th top soil and some pellets that help soil retain water. The experiment station will become an extension age when the resear is complete.

White Fly Eradication-

The project is funded by the US PL480 Program. Professor Yasse

Osman, Dr. Moawad, Dr. Samia M. A. Nada, Plant Protection Research Institute.

Lab Name: Soil Analysis Lab
Address: Desert Development Center, Experimental Station - Sadat City
Phone Number: 049-200776

Contact: Dr. Adly Bishay or Dr. Seif, Desert Development Center
113 Kasr El Eini St., Cairo,
tel:3576331/3576339

Working Hours:

Services Offered:

1. Soil Analysis

Soil analysis includes the following tests: evaluation of EC and pH and soil texture and determination of percentages of calcium carbonate, organic matter, soluble cations, soluble anions, macro and micro elements. It does not include testing for boron, nitrates or ammonia, but these tests can be carried out upon request.

2. Other Tests:

Plant analysis, nutrient solution, irrigation water and drainage analysis of foliar fertilizer are all available.

3. Integrated Soil Survey:

Evaluation of soil aerability, permeability, infiltration, and determination of water requirements for various crops are available.

Fees: The fee for complete soil analysis is 50 LE. For an integrated soil survey, the fee is from 10-30 LE/fd depending on the total number of feddans, and transportation costs must be arranged at the time of the request for the test.

Lab Name: Tissue Culture Lab
Address: Agricultural Development System (Egypt-California), College of Agriculture, Cairo University, Giza
P.O. Box 136, Orman, Giza

Phone Number: 722638

Contact: Dr. M. El Barkouky

Working Hours: 9 a.m. - 3 p.m.

Services Offered:
Tissue cultures from the following varieties and rootstocks are available LE:

1. Apples - Anna cultivar and MM106 rootstock, (also Ein Shemer and Dorsett Golden cultivars
2. Peaches - Florida Prince, Earli Grand, and Desert Gold cultivars and Nemaguard rootstock
3. Plums - Hollywood, Japanese, Golden Beauty, Mary Bosa, Santa Rosa, and other cultivars with Mirroplum rootstock
4. Figs - Fig varieties that produce fruits for drying suc as: Black Mission, Conadria, and Doretto
5. Pears - Le Conte, Hood, Bartlett, and Asian, and communi rootstock
6. Olives - Picual, Manzanello, Mission, Agouzy, Toffahy, Shemlaly, Hamed Dolei
7. Bananas - GN, Williams and Chikita
8. Grapes - Flame Seedless, Ruby Seedless, Cardinal, Riviera Muscat, Perlette, Monica, Black Rose, Red Gable
9. Citrus - Frost, Pearlent, Bonanza, Valencia 123 and 10, R Valencia, Hamlyn, Pineapple, Red Grape Fruit, Chinese Mandarin, Rasheedy Lemon and others, and volka mariano and emilikaria rootstocks.

Fees: Prices for the tissue cultures range from 0.80-5.00 LE.

Lab Name: Micronutrient Project Lab (GTZ)
Address: The International Center for Rural Development, Maryout - El Amereya, Alexandria
Phone Number: 980007/980111/980112

Contact: Dr. Mohamed El Fouly, National Research Center, Tahrir St., Dokki Tel:718389, 701211, 701433 (4755)

Working Hours: 9 a.m. - 3 p.m.

Services Offered: Since 1970, the Micronutrient Project has moved from the pure laboratory stage to fields and crops all over Egypt. Fifty multidisciplinary experts and technicians have been trained in this endeavor, and are now considered one of the best teams in the micronutrient field on an international level, and the finest in the Middle East.

Services include:

1. Soil testing and plant analysis
2. Evaluation of nutrient status of farms or plots
3. Suggesting ways of correcting deficiencies and attaining nutrient balance
4. Providing crops with required micro-nutrients as part of integrated and balanced crop nutrition
5. Following up and monitoring the success of suggestions through soil testing, plant analysis, visual observation, and crop yield

Fees:
Fees for analysis range from 40-100 LE/fd depending on the crop. The fee for analysis includes the cost of soil testing, plant analysis, recommendations, provision of micro-nutrients, follow-up, labor and transportation.

Lab Name: Soil and Water Institute Lab
Address: Soil and Water Institute, Gameat El Kahera St. Giza
Phone Number: 720603/723000/724269

Contact:

Working Hours:

Services Offered: The Soil and Water Research Institute Provid the following services:

1. Analysis of the natural properties of the soil: Determinatio of percentages of Calcium Carbonate, stones, organic matter, degree of soil permeability, and analysis of the moisture curve

2. Chemical Analysis: Evaluation of EC conductivity, pH, and th presence of various cations and anions and macro- and micro-nutrients.

3. Water Analysis

4. Plant Analysis

The Soil and Water Institute has many laboratories throughout Egypt. They include the following:

1. Lab for Acid and Alkali Soil
   Bakkous, Alexandria
   Tel: (03) 5704443/ (03) 5704441

2. Soil and Water Lab
   Ismailiya City, Ismailiya
   Tel: (064) 226178

3. Soil and Water Lab
   Saha, Kafr el Sheikh
   Tel: (047) 322409

4. Soil and Water Lab
   El Gomeza, Gharbia
   Tel: (0540) 460508

5. Soil and Water Research Station
   El Sarw, Damietta
   Tel: 322048

6. Soil and Water Research Station
   Noubariya

Fruits Introduction (cont.)

Tel: (03) 36010

7. Soil and Water Research Station
Sods, Beni Suef
Tel: (082)400342

8. Soil and Water Research Station
Malaury, El Minya
Tel: (086) 652849

9. Soil and Water Lab
Shandaurl, Sohag
Tel: 3240066

Fees: The fee for a visit to a site of more than 50 feddans and a site report is 5ᴜ LE.

The fee for chemical analysis and preparation of technical report for one feddan is 5 LE/fd, with a minimum charge of 25 LE if the analysis is made on less than 5 feddans.

The cost of labor and transportation is not included and should be arranged at the time of the request for analysis.

Lab Name: The Center for Strawberry Improvement and Non-traditional Crops
Address: Faculty of Agriculture, Ain Shams University
Shoubra El Kheima
Phone Number: 2701248

Contact:

Working Hours:

Services Offered: Provide tissue culture for strawberries, bananas, asparagus, artichokes, and potatoes.

Fees:

Lab Name: Tissue Culture Lab, Desert Development Center
Address: Sadat City
Phone Number: 049-200776
or at The American University in Cairo, 3576331

Contact:

Working Hours:

Services Offered: Successful procedures for producing plants suitable for desert agriculture have been established at the DDC Tissue Culture Laboratory. Examples are:

- Multipurpose salt tolerant forest trees (casuarina, Eucalypt and Acacia), apple rootstock (MM106) and the Williams variety of banana.
- Research on date palm is underway.
- Applied research is underway to develop salt tolerant lines of high yielding hybrids of tomatoes and cucumbers.

Fees: